

**P E R S O N A L**

# COMPUTER

EVERY THURSDAY

50p Nov 3-9, 1983 Vol 1 No 35 **NEWS** THE COMPLETE COMPUTING WEEKLY

**FX ON THE BBC**  
Put yourself in full command



**LITTLE BROTHER**  
Your type of print at £170?

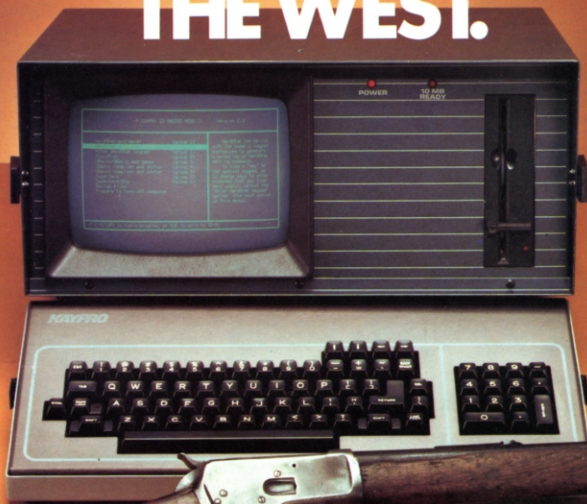
**PROGRAM GUIDE**  
Forth sorting and sequencing

**GAMES TO PLAY...**  
...for Atari, Spectrum, Ace & 64



**UK first...  
CAN KAYPRO  
CARRY IT OFF?**

# KAYPRO. OUR WINCHESTERS HAVE BEEN WINNING THE WEST.



**KAYPRO 10  
£2875**



A 9" screen that's easy on the eye.

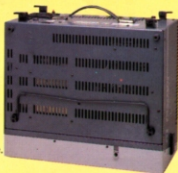
scheduling, sales performance analysis, technical processing ... or wherever real memory storage is vital.

More bang for your buck isn't the only reason why the Kaypro 10 and the floppy disk

Packs away into a light steel carrying case.

Winchester Disks. That's the short answer why the Kaypro 10 professional computer is carving out big market territory for itself in the U.S. Ten Megabytes of integral hard disk storage give it the edge over other systems in its price bracket.

And because the Kaypro is truly portable you can take it out into the field with you to tackle the big challenges head on: production



Kaypro 2 and 4 make sense for every business that's going places. There's a 9 inch screen, a stylish alphanumeric keyboard and access to a whole world of standard software (with a FREE get-you-started set of software applications including word processing and financial spreadsheet).

Find out more about the portable system you won't outgrow from your Kaypro dealer. Or cut out the coupon for more details. The Kaypro range starts at £1,395.

To CK Computers, sole UK distributors of Kaypro.  
Please send me more details of the Kaypro range.

Name

Company

Address

Tel. no:

6 Devonia House, High Street, Worle,  
Weston-Super-Mare, Avon, U.K.  
Tel: Weston-Super-Mare (0934) 516246.  
Telex: 45786.

**CK Computers Limited**



EVERY THING YOU WANTED TO KNOW ABOUT PROGRAMMING...  
...but were afraid to ask

PULL IT OUT AND READ

## Pull-out and keep Micropaedia

Design, debugging and program structure in our teach yourself programming course

## REGULARS

**Monitor** 2  
Industry claims more casualties — 2; PCN gets its hands on Coleco's Adam — 3; Husky turns hunter — page 4; Casio blooms at Amsterdam show — page 5; UK leads in home computer use — page 6; Meet the new NewBrain masters — page 9.

**PCN Charts** 10

**Random Access** 13  
Readers' letters, with a crisp tenner for the best.

**Routine Inquiries** 14  
Whatever your machine, whatever your problem, we can probably help.

**Microwaves** 16  
Your tips cover Atari and Colour Genie displays, sound on Oric and Dragon, and a couple of Commodore utilities.

**Binders offer** 44  
Keep your collection in mint condition.

**Readout** 57  
New books for 64, Apple and BBC owners.

**ProgramCards** 53  
Two educational programs for the ZX81 and Oric.

**Back Issues** 73  
If you like the look of this issue just see what you missed.

**Databasics** 74  
Buyer's guide to peripherals.

**Quit/Dateline** 88  
Who won £20 for making us laugh? We name the name.

Cover photo: Howard Kingsnorth. Styling by Lindy Pettitt.  
Desk: Cabochon Furniture. Lamp: clock tray, pen holder vase: Astrohome Ltd.

## PCN PRO-TEST: HARDWARE

### Carry out Kaypro

Portability and hard disk storage in an executive-style box. Kaypro makes its bid to mop up after the demise of Osborne... David Guest picks up the story.



18

## PCN SPECIALS

### Hot CoCo

Make more of graphics on the Tandy Color Computer, thanks to Harold Gibson's techniques with low resolution and the Print @ statement.

25



### BBC Special FX

Paul Giblett's guide to the BBC operating system via a complete dictionary of \*FX commands.

30

## PCN PRO-TEST: SOFTWARE

### Spectrum edited

Not an abridged micro but a package called Mentor designed to ease Basic programming on Sinclair's best-seller. Ted Ball undertakes the course of study.

33

### Sinclair takes stock

Keep track of the comings and goings with this off-the-shelf program for the Spectrum. Bill Quentin reports.

37

### BBC schools programs

Colin Cohen checks out a range of educational entertainment.

38



## PCN PRO-TEST: PERIPHERALS



### A little brother

Take a portable typewriter, add a RAM store and give it the facility to hook up to a micro and what have you got?

41

### Ace in print

John Lettice, still in the printing department, investigates a Centronics interface for the Jupiter Ace and the Spectrum.

46

## GAMEPLAY

Valhalla brings out the Viking in Spectrum owners

48

PCN brings together a batch of the latest Commodore 64 games.

50

Cube roots on Atari and 64 with Slinky and Hexpert.

56

**CHARACTER SET** EDITORIAL: Editor Cyndy Miles Deputy editor Geof Wheelwright Managing editor Peter Worlock Sub-editors Harriet Arnold, Leah Batham News editor David Guest News writers Ralph Bancroft, Sandra Grandison Hardware editor Ian Scates Features editor John Lettice Programs editor Ken Garroch Listings Editor Wendie Pearson Editor's assistant Nickie Robinson Art director Jim Damsie Art Editor David Robinson Assistant art editor Floyd Sayers Publishing manager Mark Egan Assistant publishing manager Sue Clements ADVERTISING: Group advertising manager Pat Dolan Advertising manager Nic Jones Assistant advertising manager Mark Satchell Sales executives Christian McCarthy, Marie-Therese Bolger, Julia Dale, Dik Veenman, Alison Hare, Deborah Quinn Production manager Eva Haggis Microshop Production Nikki Payne Advertisement assistant Jenny Dunne Subscription enquiries Gill Stevens Subscription address 53 Frith Street London W1A 2HG 01-459 4242 Editorial address 62 Oxford Street London W1A 2HG 01-636 6890 Advertising address 62 Oxford Street London W1A 2HG 01-323 3211 Published by VNU Business Publications, Evelyn House, 62 Oxford Street London W1A 2HG © VNU 1983. No material may be reproduced in whole or in part without written consent from the copyright holders. Photos by Quickset, 184-186 Old Street, London EC1. Printed by Chase Web Offset, St Austell, Cornwall. Distributed by Seymour Press, 334 Brixton Road, London SW9, 01-733 4444. Registered at the PO as a newspaper.

PCN

# Cantab crashes

By Ralph Bancroft

Jupiter Cantab, manufacturer of the Jupiter Ace, has ceased trading and is to go into liquidation.

The company, which has never employed more than five people, is the latest victim in the increasingly cut-throat microcomputer market.

The Jupiter Ace, in its time, was an innovative computer using Forth as the resident language. The trouble was that the time ran out all too quickly.

The micro has been beset by difficulties for most of the year. The late delivery of expansion memory and software by Jupiter Cantab proved to be a major handicap.

The company has also had its internal problems. One of the founders of the company, Richard Altwasser, who designed the hardware for the machine, left in July and resigned as a director. This left the firm in the hands of Steven Vickers, its software expert. He was

joined by Geoffrey Walker as marketing director.

The changes in the management came at a time when sales of the Ace started to falter. The company stopped advertising in micro magazines, and the Ace dropped out of PCN's top 20 hardware chart at the end of June.

While the Forth language has a dedicated following, few software houses produced programs for the Ace.

One such company is Brighton-based Remsoft, run by John Noyce, who also runs the Jupiter Ace Users Group. Commenting on the demise of Jupiter Cantab Mr Noyce said: 'It's been on the cards for some time. The Ace was the only product it had. It was getting old and its design was not as fully thought out as it could be.'

The next step in the winding up of the company will be a creditors' meeting on November 8 when a

liquidator will be appointed.

But the Ace may not disappear. An improved version in a more substantial case, called the 4000, was being made for release in the US. Remsoft is negotiating with Downsway Electronics, which has already manufactured a supply of machines ahead of the launch, to make a limited number of the 4000 for the UK market.

John Noyce said the user group, which has 300 members, will continue in order to help owners of the Ace. He thought that Ace users should not suffer too much by a lack of support for the machine. 'The circuit board of the Ace is well made and not likely to fail. The main problem is the rubber keys wearing out. But many people are already switching over to full travel keyboards,' he said.

There were no immediate signs last week of a Newbrain-style rescue bid.

## Home control system faces liquidation

A system that points one possible way forward for home computers faces extinction this week.

Radionic, a West Country firm of electrical engineers, is likely to pass into liquidation and its micro-based home control systems could be lost. According to John Bowring, Radionic's managing director, £65,000 is needed to see that the system survives.

The Radionic CNS system drives exotic peripherals that let you set a micro up as a burglar alarm, a home 'weather centre', a disco lights show controller, and as the heart of other functions around the house.

It is built around a Tandy-compatible system from Hong Kong, the Komtek micro, with a cassette recorder and a monochrome monitor. The micro itself costs £180, the full package about £300. You can use it as a standard home micro, but Radionic's intention with the CNS was to take micros beyond the realms of games and into something closer to DIY.

'We felt that the public had had enough of games,' said Mr Bowring. 'Our raison d'être has been to make people do it for themselves. We aim to set up a club to stay close to the kids who buy these systems and they'll suggest functions that we can add.'

At the moment it has about a dozen functions running off the CNS — these span utilitarian, educational and home entertainment.

Some of the 'peripherals' look as though they might have been constructed from Blue Peter designs but that is the whole point, Mr Bowring says. The systems are intended to be cheap to develop and they use very basic components. Radionic plans either to supply them ready-made or provide such detailed documentation that people will easily be able to build their own.

Radionic's background lies in the toy trade, and its present problems stem from a downturn in that business over the last three years. 'We have tried to save it (CNS) with City money,' said Mr Bowring, 'and they have suggested starting again with a clean slate.'

But so far the money has not been forthcoming. Ironically, with Inmos down the road costing the UK taxpayer more than £100 million so far, a product may disappear for want of £65,000.

The product itself seems to reflect what Gary Kildall at Digital Research sees as the way forward for home computers (PCN issue 32) — away from games and into control functions.

If Digital Research wants to do it, it can't be a bad idea.

## Econet farce

Schools who have bought BBC micros have found that they cannot get hold of Econet systems to link the machines into a network.

In many cases the dealers who supplied the original machines are not allowed to sell and install Econet systems. As a result schools are being forced into a ludicrous situation where their hardware is serviced by two completely different companies.

The ban on Econet sales has been laid down by Acorn. Apparently, the company considers that Econet is a 'high-tech' product and it is only allowing a small percentage of dealers to install it.

'We need to be satisfied that the dealer has the technical expertise and facilities to install the system properly and provide a full after-sales service,' a spokesman said. As a result Acorn recently introduced a certification scheme.

One school caught in the trap is the High School of Glasgow. It had placed an order for Econet and originally expected delivery in the summer, in time for the start of the autumn term.

The High School had bought its BBC micros from a local dealer, Comscot, which gets its supplies from Acorn distributor Leasalink Viewdata. Because of Acorn's certification scheme Comscot has found it virtually impossible to obtain a supply of Econet hardware and software.

Mr J Simonis, the school's assistant bursar, says that the school gets excellent service from Comscot and would like to have its Econet system installed and serviced by the same company. He is therefore far from happy with the situation the school now finds itself in.

## TI axes 99/4A

By Geoff Wheelwright and Brian Power  
The Texas Instruments TI 99/4A home computer is dead.

Texas Instruments announced on Friday that it was getting out of the home computer business as of November 1 after recording a loss of \$110.8 million in the third financial quarter this year and a \$119.2 million loss in the previous quarter.

In a statement for the press, the company said: 'The first nine months of 1983 have been the most difficult period in the history of TI. In order to limit further financial strain, we have made the decision to withdraw from the home computer market — we believe that the painful, but correct, decision to withdraw (will mean) that period has now ended.'

The decision also means, of course, that research and development work on the home computer to replace the TI 99/4A will cease

immediately and that TI will not be releasing any more home micros.

TI added, however, that the home computer shutdown will mean the company is free to concentrate on their more up-market business machines. 'These actions do not in any way affect TI's participation in the professional computer market,' it said.

The company still intends to sell portable micros with its CC-40 computer and its line of professional and scientific programmable calculators.

It will offer special prices on remaining stock of TI 99/4A machines in the US, but a spokesman for TI UK said he wasn't sure how the decision would affect the price on remaining UK stocks. He stressed, however, that TI will still support servicing and maintenance of existing TI machines — although software may become scarce.



TI 99/4A — the latest casualty of the US micro war.

# Adam die cast

By Brian Power in Vancouver

The video games company Coleco will finally begin delivering its much-publicised Adam computer this week to retail stores across the US, and the customers who have been swamping Coleco with calls will find it performs to spec for the most part.

The Adam is a complete system that includes 80K of RAM, a fast access tape drive, a letter-quality printer, and built-in word processing software, all driven by a Z80A microprocessor.

It will cost \$700 in the US up from the original announced price of \$600. Coleco won't explain why the price has increased but insiders say there were difficulties with the printer, the tape drive, and the

software. The company's earlier forecast that it would ship 500,000 units by the year's end has been trimmed to 400,000, although Coleco boasts that customers have already placed deposits on 100,000.

The fortunes of the video games company have been pegged to the Adam ever since Coleco first showed the machine last June at the Chicago Consumer Electronics Show. The interest it created was spectacular and it didn't abate in the ensuing months.

A review of the Adam shows that the micro lives up to its advanced billing in most particulars. If the Adam faces any problems it will probably be with the printer, which is constructed mainly of hard plastic and has yet to prove it will be able to

stand up to the rigours of constant use.

The word processing program is extremely easy to use and the on-screen prompts make it unnecessary to follow the user's manual. But the Adam takes only 36 characters per line, hardly a number adequate for word processing. An 80 character upgrade is planned for early next year in a \$300 module that will also include a floppy disk drive.

The system currently comes with one high-speed tape drive that Coleco says is eight to 16 times faster than standard tape units, and this element of the system appears to work well in a review.

■ PCN will carry a full Pro-Test of the Adam in a forthcoming issue.

## CW/P unveils £300 printer from Japan

By Wendie Pearson

Cortex-maker CW/P (*Issue 33*) has laid its hands on one of the new wave of very cheap, very slow Japanese daisy-wheel printers.

It will be selling the Silver Reed EXP 500 with a parallel interface for £299—a serial interface will cost an additional £60.

Compatible with most micros, the printer runs at 11 cps, has one year's free warranty rather than the more usual three months, and can be repaired at 250 Silver Reed service centres throughout the UK if it goes wrong.

CW/P is also selling floppy disk drives for the Apple II for £159, undercutting Apple, whose own units retail for £281.75.



**THREE-SCORE** — The Alphacom 32 printer, which has been selling like the proverbial hot cakes in the US to users of Times/Sinclair machines, has had its UK price cut by its distributor Dean Electronics. The new price, £59.95, is down from £99.95 — that's still some way above the price of a ZX printer but the Alphacom unit takes paper that costs only £1 a roll. The printer uses Olivetti's thermal mechanism and is claimed to be maintenance-free throughout its lifetime. You can buy it from stores such as Greens and WH Smith or mail order from Dean Electronics on Winkfield Row (0344) 885661.

## Hyperion meets Ajile threat

The Hyperion portable has become the latest system to come down in price. One of its UK distributors, Bytec-Gulfstream, has taken 14 per cent off its price and added free software.

The Hyperion, built by the North American company Bytec, is also sold in the UK by Anderson Jacobson under the name Ajile.

A Hyperion from Bytec-Gulfstream will now cost £2,599, and that will include the Aladin database management system. The Ajile's recommended retail price is £2,995 — but that hasn't stopped it beating the Hyperion into PCN's Charts (it holds the number nine position).

production schedules back on course.

Cabel was reluctant to go overseas for components when a major supplier let it down, and as a result of lost production it lost orders. But it says that it now has its production sorted out, with 1,000 units a month coming out, and that there should be no further problems. Cabel is on Tewkesbury 0684-298840.

## UK monitor maker sorts out problems

Flag-flying has cost UK monitor maker Cabel orders over the summer but the company says that it has overcome its problems and has its

## Low marks for effort

Griffin and George, well known for its supply of scientific hardware for schools and colleges, has jumped on the educational software bandwagon.

Last week saw the release of four packages for the Spectrum and BBC micros. None of these is brand new; they are revised versions of Griffin's large educational library.

You'll have to wait several weeks to see the really new products. Even

so, if the standard of the launch software is anything to go by, you might be better off shopping around. Although the programs are well presented with nice packaging and parents' pamphlets, they give the distinct impression that they are aimed at parents rather than their children.

Covering the maths and spelling areas the suite lacks innovation and falls short on imaginative approaches to the subjects. They fall in the rote-learning and drill practice school of instruction, and few children will feel motivated to spend more than a few hours on the programs.

## Oric ROM near

By Bryan Skinner

The signs pointing to a new ROM from Oric are growing clearer. Following Softek (*Issue 32*), a second software house has revealed a new Basic compiler for the Oric-1.

Oric maintains that no new ROM will be released until all its software suppliers have approved it. 'We don't want to get into the situation Sinclair did with its ULA in the issue 3 machines,' said a spokesman.

Oasis Software has announced the imminent release of two new packages for both the Oric and the Dragon. These are to be a Basic compiler and the structured language Pascal. They will cost in the region of £15.

Oasis said that it actually has a copy of the new ROM and has been using it for the compiler development — the Basic compiler will therefore run on both the old and new ROMs.

Oric International says that some software houses have been supplied with 'EPROM versions of a prototype new ROM' in order to modify existing programs and to develop new software. Oric said that the

new ROM has had all the old bugs ironed out and has several new features 'not included in our brochure'.

A spokesman said that 'most' existing software 'should' run on the new ROM, but refused to go into detailed comparisons of the old and new ROMs. One comment made was that there would 'probably' be an upgrade path (ie from old to new) but that as the new ROM was still in the pre-production phase, no marketing policies had as yet been worked out.

No release dates were given, but following a recent warehouse fire in which some 15,000 old-ROM machines were destroyed, Oric will probably be bringing production of the new ROM forward as fast as possible in order to meet existing orders and gear up for the Christmas rush.

As an interesting aside, it seems that following Oric's fire on the Thursday night, a neighbouring warehouse went up on the Friday. Police are said to suspect that an arsonist got the wrong building the first time round...

## VIEW FROM AMERICA



## Crackers in Christmas advertising

By Chris Rowley

The seconds tick away towards Christmas. The hardware makers take their places around the blazing Yule log, touting their stocking fillers. Millions of dollars are at stake but what you'll see is an innocent group of cheery Santas in a synthetic chorus of Hark the Herald Salesmen Sing. But there's a lot of jostling in the back row and some of the Santas' smiles are looking strained. After all, they want to have a job next year and the big fellow who insists on wearing a blue costume keeps threatening to push them all aside.

But Apple has apparently discovered that IBM has placed no Peanut-type advertising for the fourth quarter and in consequence is racing to bring out the Macintosh. According to those who have seen it, the Mac is a Big Step Forward in the \$2,000 range of home personal computers.

Clearly, Apple wants as many II and IIe upgrades as it can hang on to, and if the Mac lives up to the advance billing it will get them. Software compatibility remains the big question mark over the orchards.

There was considerable activity elsewhere, for example Radio Shack (ie Tandy) entered the transportable market with a potential winner in the 5in screen version of the TRS model 4. Dubbed the Model 4B (as in beta) it has 64K RAM expandable to 128 K plus twin double density floppies, and all for just \$1,799. Which is close to competitive with the Kaypro II and can run all the software developed for the Model 4 and Model III.

Hard disk machines in the sub-\$3,000 bracket are beginning to proliferate, thus offering the Kaypro 10 competition. There is the Morrow MD 11 which has 11Mb, runs CP/M, has 128K RAM on a 4MHz Z80 and has backup double density disks with 400K each plus a parallel port and three serial ports.

This machine is not transportable but it does cost \$2,950. Kaypro meanwhile now feels big enough to enter the advertising fray on TV, its sales having reached \$75 million last fiscal year (1500 per cent increase over 1981/82). Kaypro has budgeted \$4 million to promote itself as the market Volkswagen, half the price of the IBM Mercedes.

Coleco announced the first shipments of the Adam. So, ladies and gentleman, the die is cast and of course a lot of money riding on it. To help things along Coleco has budgeted \$25 million in advertising.

Commodore is said to have a full 30 per cent of the home computer market now, so president Jack Tramiel switched ad agencies again. Myrdin Jones, vice-president of marketing at Commodore commented 'This shows that Jack Tramiel considers business as a war'.

The reason for the agency switch? 'None of anybody's business,' says Jones. This was the third agency in as many years for Commodore.

However there is one reservation. Tramiel believes senior management must perform very hard every day, and the doors marked 'exec' revolve swiftly as a result. In the view of some analysts this leaves Commodore vulnerable, too dependent on the top.

Meanwhile over at Warner Communications the words V'D' G'M'S have been banned on upper floors. The corporate death squad cut 250 HQ staff after a loss of \$122.4 million in the last quarter.

Atari's fate now seems to be resting on the Alan Alda series of commercials. Warner has budgeted \$50 million for the fourth quarter Alda ad-blast.

Just to show that experienced mainframe computer companies aren't that much better at predicting the ways of micro marketing, DEC announced alarmingly poor results for the quarter. Wall Street immediately shivered and several computer stocks went down a point or two.

Sharing the front pages with such glum stuff was the happy absurdity of the FBI's dawn raid on dozens of youthful hackers in several cities. Naturally, Southern California was the heart of the problem.

From NASA came the word that several pranksters have been reading through the Tele-mail and leaving messages here and there. Intruding persona included 'Mad Bomber', 'Space Shuttle', 'Kilroy XIV' and so on.

# A little Husky

The portable Husky computer will get a smaller sibling this week.

Husky Computers (formerly DVW) is set to bring out the Husky Hunter, an aluminum-clad Liquid Crystal Display, CMOS-memory portable about half the size of the Tandy Model 100/NEC 8201A portable computers. The machine will cost about £1,000, include 70K of non-volatile memory and run a CP/M-like operating system.

Memory on the machine is expandable up to 208K, in lots of 64K at a rate of £500 per 64K. The keyboard is Spectrum-style 'squishy', but maintains a tight enough seal with the main body to keep the machine totally waterproof.

Although it admits the price

might seem a bit high for a consumer machine, Husky says it hopes to sell the new machines mainly to companies and professional people. It already has interest from the Ministry of Defence.

The most interesting aspect of the machine, however, is not the size or the memory — but the fact that it supports a CP/M emulation. The emulation means that you can download a CP/M program to the Husky Hunter (license agreements permitting) and then run that CP/M program in the field.

The CP/M emulation will treat the memory like a disk drive, and the 'scroll-across' feature of the Hunter's 40-character by 8-line gives you a simulated 80-column screen.



Husky's Hunter — a tough portable with 70K of non-volatile memory.

## Using OS-9

A new user group has been set up for people interested in OS-9, the disk operating system that will be used in the Dragon 64 due out next month.

The group is affiliated to the Kirklees Computer Club and is intended for students and commercial users.

OS-9 is a relatively new operating

system which is designed to work with the Motorola 6809.

Apart from working with the 6809 — a fast and powerful 8-bit chip sometimes referred to as the programmer's chip — OS-9 has many Unix-like features.

For further information contact Mr MR Ellis, Secretary, OS-9 User Group, 1st Floor, 16 New North Parade, Huddersfield, HD1 5JP. Telephone 0484-516179 (daytime) or 0484-864130 (after 6pm).

# Rugged Ricoll

If you thought Sinclair add-on keyboards were all pretty much of a muchness, you've got a surprise coming. The metal-cased Ricoll RIKB1 bounces off the obstacles other keyboards find terminal.

For £37.95 Ricoll (Ormskirk 79104) has produced a keyboard radically different in approach from its rivals. It has a space bar and 41 industrial-quality keys, but it doesn't follow the current practice of putting PSU, interfaces and so on inside the case.

A Ricoll spokesman said there were a number of reasons for this, and for the all-metal construction. Plastic keyboards tend to break if

you drop them, and as Ricoll is looking at the educational market, toughness is important.

Keeping the PSU outside the case should also mean that there will be no earthing problems, and electrical noise will be kept down. And apparently the metal case is ideal screening if you happen to use your micro with a CB rig...

You can fit the RIKB1 to your Spectrum or ZX81 easily, but Ricoll also operates a fitting service at no extra charge. Because of Ricoll's design policy, it probably won't be that easy to run it with Interface 1, but the company will be looking into this.

# Casio comes of age in Amsterdam show

By Sandra Grandison in Amsterdam

Although it wasn't the season for tulips at Comdex '83 in Amsterdam, it was certainly a blossoming event for the launch of new micros.

The show attracted the biggest names in the computer business from Japan, the US and Europe. For some companies it was the first time their products had had a viewing at a big European exhibition.

At least six machines made their first public appearance and among them Casio put up no fewer than three offerings for people to look at. This is the first time the pocket

standard keyboard, the machine comes with a monitor giving 640 x 200 dot resolution.

The 8086-based FP-6000 running MS-DOS is a 256K RAM machine. Depending on the configuration, it can hold up to 20Mb and offers any eight colours at once from a choice of 16.

On its own soil, Dutch electrical giant Philips showed its answer for the portable market. The P2000C consists of three models—the main difference being the storage capacity.

All machines run the familiar Z80 processor using 64K RAM, and



Spectraideo — jumping the MSX gun with its SV.328.

with Microsoft to use MSX.

MSX is a set of standards for 8-bit home computers and means that the SV.328 will be CP/M compatible and run all Microsoft's 8-bit software. Selling at around £299 when it reaches the UK this machine will make an attractive buy, especially with the abundance of software already available.

Some of the impressive features of the SV.328 include 80K RAM expandable to 144K, 16 colours, 32 graphics sprites, three sound channels and eight octaves. In addition Spectraideo had its slightly older machine the SV.318 on show.

The Amsterdam event is a spin-off from the Comdex shows that have attracted large crowds in the US — the next takes place in Las Vegas next month. Like many European trade shows (particularly the Hannover Fair in recent years) it proved to be something of a showcase for the Japanese — but

this time they didn't have the field to themselves.

The US companies that have stayed away from Europe in the past, at least as far as any substantial presence at shows is concerned, were there in force. In the portable class there was the Attaché, of course, and also Non-Linear Systems in the guise of the Kaypro systems. The Kaypro is unassumingly taking over the mantle of the Osborne, and it looks as though it could be raising its profile to play the part to the full.

Undoubtedly, the show didn't draw many end users — it was more of a gathering for companies to get a taste of what's happening in the industry and to clinch a few deals. As the manager of a computer company admitted: 'To be quite honest if you've already got a distribution network in Europe for your product then this show wouldn't hold much for you.'



Attaché — the last pre-Peanut IBM-compatible

computer expert has moved to home and business computers.

For the home computer user was the Casio PV-2000, alternatively known as Quick-Draw. Using a Z80 processor, 4K of RAM, 16K of ROM and 16 colours — with 28 sprites — you can produce interesting characters using the spongy-type keyboard.

In addition to its normal 68 Ascii key layout, the machine has some function keys for games playing and drawing. There are two attack keys and eight cursor control keys for drawing vertical, horizontal and slanted lines.

Sound effects can be achieved with the three voice chords, four musical octaves and one effects box. Built-in software includes C-83 Basic for background picture creation and animation movement.

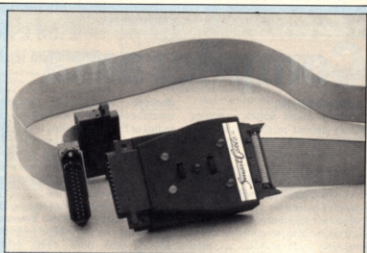
On the business side were the FP-1000 Series and FP-6000, an 8-bit and 16-bit respectively. The FP-1000 has 64K RAM for main use and 16K RAM dedicated to the video. And in addition to its

have a low profile keyboard and 9in monochrome monitor. The P2010-1 and P2010-2 have 2 x 160 floppy disk drives and come with a word processing and spreadsheet program. The P2012 has 2 x 640 floppy drives and comes with Basic.

An American company called Otrona displayed an IBM-compatible portable computer called the Attaché. A little on the heavy side at 20lbs, the machine runs dual processors Z80 and 8086.

With 5 1/2in display, 256K RAM and fold-away keyboard, the Attaché comes with two 5 1/4in disk drives holding 360K each. Running MSDOS 2.0 and CP/M 2.2 the machine will give you a lot of software from which to choose, and for starters two packages are thrown in.

Japanese computers manufacturer Spectraideo had its latest brainchild, the SV.328 personal computer, on view. Pitched at the home user, the machine hopes to join the ranks of 14 other Japanese companies after it clinches a deal



RIGHT CONNECTIONS — A handy little gadget called the Smart Cable 817 appeared at Comdex. It is an intelligent interface that looks at the RS232C signals from the computer and peripheral, and uses its own logic circuitry to make the right connections. All you do is plug in the cable and set two switches. The Smart Cable matches up all the data, handshaking and control lines automatically. Contact IQ Technologies, Inc. 11811 N E First Street, Suite 308 Bellevue, Washington 98005.

# Commodore rules

We may be also-rans at world domination, cricket and the Eurovision Song Contest but Britain still leads the world in at least one thing — the computer use.

At the end of last year 5.7 per cent of the UK population owned a computer. Not even the US could match this figure — it had 5.1 per cent.

The numbers come from Dataquest, which also discovered that Commodore has by far the largest proportion of sales in the sub-£1,000 bracket.

It put the total value of systems sold at \$563 million, of which Commodore had supplied (or

raked in, depending on your point of view) 43 per cent. Reflecting this domination, Commodore has reported profits of \$24.3 million in its most recently completed financial quarter, an increase of almost \$10 million on the same period last year.

Commodore also leads the field, according to Dataquest, in the number of systems sold — of a total estimated at 2.54 million it has contributed 37.9 per cent. The nearest challenger was Texas Instruments with 21 per cent, and Sinclair (by courtesy of Timex) came third with 19.7 per cent.

Atari is fourth and Tandy fifth. Tandy is the only manufacturer in

the list apart from Commodore that doesn't have any serious clouds on the horizon. TI is in serious trouble in this section of the market; Timex

is feeling the pinch in the US price war; and Atari is widely believed to be on the brink of financial collapse.



Commodore — cleaning up in home micros of the sub-£1,000 class.



**VOX POP** — Following Fidelity, Solavox has broken the £200 barrier for colour monitors with a 14in model that sells for £169. There are also 20in, and 22in sets, and the larger television can be supplied with remote control and Teletext, taking the price up towards the £350 range. The 14in screen doubles as a portable television, with a fold-away handle and indoor aerial, and eight stations to choose from. It is sold through Comet discount stores.

## Compilerama

By Wendie Pearson

Software house Softek is getting firmly behind machine code programming with three new products for the Spectrum.

It has launched a kit called The Complete Machine Code Programmer which contains a machine code monitor-assembler and an editor-assembler together with a booklet. It is intended to introduce people to machine code and to act as a reference guide. The kit consists of a pair of cassettes and costs £12.95.

Suitable for 16K or 48K, the IS compiler and FP compiler will turn Basic into machine code so that you can get the benefit of machine code speed without having to learn it.

The IS compiler won't handle

decimals, but it will produce machine code that is up to 200 times as fast as Basic, according to Softek boss Tim Langdell, while the FP compiler is a 'floating point' compiler that will handle decimals and will produce code that is claimed to run 10 times faster than Basic.

They are both on cassette — IS for £9.95 and FP at £19.95. You can save money by buying the pair for £24.95, and both come with manuals.

You can get the products, as of this week, from Boots, Lasky's or direct from the company in Covent Garden on 01-240 1422.

PCN will be reviewing the IS and FP compilers in a forthcoming issue.

## Research Machine puts software in Chains

Chain, Research Machines' network system for schools, is about to bring with it the promise of £2,000-worth of software.

The packages that RML is giving away with Chain include Wordstar, Logo, and Pascal. On top of this, another £395 will buy you Multiplan, CIS Cobol, and Fortran. The presence of Wordstar and Multiplan suggests that RML is looking beyond the educational sphere for its network, and indeed a spokesman confirmed that the company was looking at the possibility of supplying business users as well.

Chain is up to version 2.0 now,

with about 450 installed around the country. The improvements in 2.0 include the spooler system, boot routines, and more flexible disk changing and directory facilities. Version 2.1 should support hard disks.

Further into the future (but probably not more than six months away) RML plans to implement 'silicon' RAM disks on the workstations that populate a Chain network — these are usually 480Z Link systems or upgraded 380Zs. This will enhance the operating speed.

Research Machines is in Oxford on (0865) 249866.



**STICKING POINT** — Instant response in a video or computer game, says Downsway Electronics, can be a vital factor in a life-and-death situation. This isn't what is normally meant by life and death but you know what they're getting at. And instant response is what Downsway promises with its programmable joystick interface for the Spectrum. The unit plugs directly into the rear expansion port of the machine and a two-way switch gives you 'program' and 'play' modes. Downsway (03727 27222) supplies the interface for £22.95 with instructions, and the device is compatible with such joysticks as the Atari/Commodore, Competition-Pro, Quickshot, Starfighter and Wico. Presumably drawing on its experience of producing add-on memories for the ZX81 Downsway says that it has paid particular attention to ensuring a tight-fitting and stable connection between the interface and the machine. The box is styled to match the finish of the computer.



More  
**WINNING GAMES**  
 from  
**LYVERS**  **FT**

**LUNAR RESCUE (48K SPECTRUM)**

A team of research scientists are trapped on the moon and you have to pilot the rescue pod from the mother ship and ferry them back safely. But you have only space for one scientist at a time. 100% M/C action with super smooth HI-RES GRAPHICS AND JOYSTICK OPTION.

**LIBERATOR (16K/48K SPECTRUM)**

This game tests your aim and reactions as you command a gunsight on a homeward royal treasure of the empire and many people want them. A machine code presentation that should have you hooked.

**THUNDERHAWK (48K SPECTRUM)**

Based on the popular arcade game Phoenix. This 100% full colour epic pitches you against the evil Albertons who are set to destroy your race. Five levels of fast action bring you to your command centre of battle fleet, can you slash the job. WITH JOYSTICK OPTION

**GOLF (48K SPECTRUM)**

Using M/C graphic routines, a game to absorb the keen novice and the scratch player. Play on a 9 or 18 hole course, with full selection of clubs. Along the greens and fairways hours of addictive sport can be had.

**PICTURE PUZZLE (DRAGON 32)**

With HI RES graphics and 100% M/C. You set the problem of putting the picture back together. Test your skill against the dragon 32 computer. A game guaranteed to hold you spell bound for hours.

**ANDROID INVADERS (DRAGON 32)**

In a change of tactics the beings beyond the stars have developed an android of human form to do their dirty work. And with the aid of sensor jamming they may prove formidable. Using full colour, M/C, hi-res graphics this game can offer up to 21 levels of combat.

**VOYAGER (VIC 20 & OR 16K)**

The mission is simple, but its completion is far from being so. As captain of a starship you have all the best facilities at your disposal. Unfortunately the klingons oppose you. A great M/C version of this classic computer game.

**SPHINK (VIC 20 & OR 16K)**

A riveting, full colour graphic adventure. That pits you against the spells and guardians of the tomb. In your quest to uncover the treasure of the pharaohs. This game will have you enthralled.

**BIRD OF PREY (BASIC VIC 20)**

The Evil Baron von Hitz is out to kill his cousin, the much loved Prince Rupert. The Baron intends to throw the prince from his eagle of the north will make every endeavour to save your friend Prince Rupert. With colour, sound, this M/C game is a must.

**ALSO AVAILABLE:**

Demon Driver Basic VIC20 — £5.95  
 Lunar Rescue Basic VIC20 — £5.95  
 Space Assault 3 or 8 VIC20 — £5.95  
 Apple Bug/Crazy Climber Basic VIC20 — £5.95

Nuclear Attack/Grand Prix Basic VIC20 — £5.95  
 Hearts & Diamonds/Hi-Lo Basic VIC20 — £5.95  
 Machine Code Monitor VIC20—£14.95

Hangman/Super Docker ZX81-16K £4.95  
 Bouncing Gorillas ZX81-16K—£4.95



- VIC-20 Machine Code Monitor @ £14.95 each
- Lunar Rescue @ £5.95 each
- Demon Driver @ £5.95 each
- Applebug/Crazy Climber (2 pack) @ £5.95 each
- Nuclear Attack/Grand Prix (2 pack) @ £5.95 each
- Hearts & Diamonds/Hi-Lo (2 pack) @ £5.95 each
- Space Assault @ £5.95 each-For 3K & 8K VIC-20

For any VIC-20

Please debit my Access/Barclaycard (delete as necessary)  
 Card   
 Number   
 I enclose Cheque/PO for £   
 Name   
 Address

Free Postage mainland U.K. only

# QUICK, SMART AND EFFICIENT



PRODUCTS FOR THE SPECTRUM, VIC-20, ZX81



FOX SPECTRUM UPGRADE KIT (ISSUE 2 MACHINES ONLY)

A high quality kit at a new LOW, LOW PRICE, which simply plugs into existing sockets within your Spectrum. No soldering is required and step by step instructions are supplied.

PROBABLY THE BEST KIT AVAILABLE AT DEFINITELY THE LOWEST PRICE.

£20.99

ECHO Amplifier and Tape Switching Interface

"ECHO" enables the ZX Spectrum sound out to be brought into the audible range. The amplifier has separate Tone and Volume controls, for the harsh or mellow sounds, and DIN compatibility, allowing a greater range of tape recorders to be used for saving and loading programs.

ONLY £19.99

HARDWARE ZX81 PANDA

The famous Panda Expandable Ram Pack. Massive 16K add-on memory which can easily be expanded to 32K with an optional plug-in module. Supplied in no-welding design, rugged, injection moulded case, contained to fit the ZX81 snugly. Compatible with other add-on printers etc. LED on/off indicator. No additional power needed just plug in and go. British designed and made from top quality components throughout, guaranteed 12 months.

16K ONLY £19.95

32K ONLY £34.00



ALSO AVAILABLE FOR THE:

SPECTRUM THE QUICKSHOT JOYSTICK (INTERFACED) £19.50 incl.

THE ECHO TAPE LOAD/SAVE SWITCHING DEVICE WITH AMPLIFIER £19.99 incl.

FD42 KEYBOARD similar to FDS but without space bar £26.95 incl.

Give your VIC-20 a new DIMENSION

Vixen RAM cartridge £34.95

Switchable between 16k or 32k or 32k. Given you the option of full 16k or 32k and 3K RAM in one package. When added to a standard VIC-20 gives 16,384 bytes of extra memory at memory blocks 1 and 2 or 3092 bytes of extra memory into the 3K memory block and 8192 bytes of extra memory switchable between memory blocks 1 and 3.

- Fully compatible with available motherboards modules.
- Simply plugs into the rear expansion port of computer.
- No re-addressing of existing BASIC programs needed.



From Fox the new FDS for the SPECTRUM, ZX81 as illustrated.

This elegant desk top system, designed for the professional user. In its slimline case, the superior keyboard contains all the graphic characters for the above computers. With the additional function keys and SPACE-BAR, speedy and accurate data entry is made simple. The Fuller FDS is case to install, based on the very popular FD42 system, it requires no soldering or technical knowledge. For the user who is reluctant to install his computer circuit board inside the FDS a buffer is available (at extra cost) which simply plugs onto the expansion port and connects directly to the keyboard.

£39.95 incl.

ZX81 FD42 KEYBOARD similar to FDS but without space bar £29.95 incl.

ZX81 BUTTON SET KEYBOARD £9.95 incl.

VIC-20 VIXEN EXPANSION SYSTEM. A four slot switchable motherboard £30.00 incl.

VIXEN LIGHT PEN. Complete with software £20.00 incl.

SEND NOW TO

# FOX ELECTRONICS

CALLERS WELCOME

141 ABBEY ROAD, BASINGSTOKE, HANTS. TEL: 0256 20671

Please send me:-

SPECTRUM UPGRADE VIXEN CARTRIDGE

ZX-PANDA 16K/32K RAM PACK FDS KEYBOARD

Name .....

Address .....

Post Code .....

24HR CREDIT CARD SALES BARCLAYCARD NO. OVERSEAS CUSTOMERS PLEASE ADD £3.50 p+p.

# MUSHROOM MANIA

For the 16K or 48K ORIC-1

So fast, it'll take your breath away!

only £5.50

FEATURES

- Written entirely in MACHINE CODE
- Over 50 skill levels
- Random scoring spiders
- One or Two Player Option
- Hall of Fame ● Full colour and sound
- Bonus lives every 18000 points ● Deadly PACPERSON attacks

Blast the fast moving centipede, as it snakes down towards you, in the depths of the green forest. Score points by shooting-up mushrooms and the deadly spiders. But beware of the hungry PACPERSON, which will gobble anything in its path. The higher your score rises, the faster the action becomes, until it is only a screaming blur of colour and sound.

Send cheque or P.O. for £5.50 (postage paid), stating computer type and memory size to:

ARCADIA SOFTWARE

FREEPOST, SWANSEA, SA3 4ZZ



# CHALKSOFT

37, Willowlea Road, EDUCATIONAL SOFTWARE  
Worcester WR3 7QP  
Telephone: 0905 55192

Offer closes JAN 31 1984

Hey Dad! We use that at school ...!

A good idea for Xmas I'll send off today

## SPECIAL CHRISTMAS OFFER

Buy two or more and get £1 off each.

- Special thanks to:
- Good computer shops everywhere
  - Access + Adtel ansaphones
  - Webster and other imaginative software distributors
  - Simon Stable's Real Time Tape Duplicating Company.

TITLE	XMAS PRICE	EACH	TICK HERE
PUNCMAN 1 & 2 Animated punctuation game. Can you help Punzman beat his brother. 7/12 years.	£9.25	BBC 'B'	<input type="checkbox"/>
	£9.25	Spec 48K	<input type="checkbox"/>
STORY A - SPANISH GOLD The first multichoice illustrated story book on screen. - (6-11 years)	£7.95	BBC 'B'	<input type="checkbox"/>
	£6.95	Spec 48K	<input type="checkbox"/>
PIRATE Simply the best adventure game for young people (7 to adult) illustrated. Computer.	£9.25	BBC 'B'	<input type="checkbox"/>
	£9.25	Spec 48K	<input type="checkbox"/>
LETTERS Let your micro teach your child to write. Drawn know-case letters ...	£11.25	BBC 'B'	<input type="checkbox"/>
	£10.25	Spec 48K	<input type="checkbox"/>
INKOSI Be an African King! Simulation. Can you look after the tribe and defeat the SWITCH DOCTOR. 7	£8.95	BBC 'B'	<input type="checkbox"/>
	£5.95	Spec 48K	<input type="checkbox"/>

I enclose a cheque for £ or debit my Access no.

Name .....

Address .....

Postcode .....

Tick at least two. Remember, if you only buy one you pay the old price. Prices include VAT and p.p.

Take this coupon to your local dealer or post direct.

# Introducing Tradecom

Tradecom International, the company that now controls the destiny of the Newbrain, will be an unknown quantity to most UK users. It was previously Newbrain distributor in the Low Countries, Scandinavia, Spain and South Africa, but how will it perform running the show, and what changes can Newbrain fans expect to see? Tradecom director Jack van der Schier has the answers.

Five miles east of the old Dutch university town of Leiden, along the banks of the Old Rhine, is a tiny village with a barely pronounceable name — Koudekerk aan de Rijn. This is the home of Tradecom International, the firm which took over the Newbrain microcomputer two weeks ago (PCN, issue 33). It's

now a matter of arranging a few formal details,' says Mr van der Schier. 'Then we can begin with a clean slate.'

The Newbrain takeover fits into Tradecom's vertical marketing strategy. Where price is concerned, the Newbrain is aimed at the lowest market segment.

What will change, now that the Newbrain is in Tradecom's hands? First of all, there will be an about-face in the access to information about the Newbrain's operating system, a subject on which Grundy Business Systems was decidedly coy. 'That will be an open matter,' Mr Van der Schier says, 'to allow the equipment to be used to its full potential.' Getting to know the Newbrain better has given



From Newbury to Teddington to Holland — the Newbrain finds a home.

Tradecom new ideas for better programs and new applications. In this respect, Newbrain user groups can count on full support from the company. Future plans for the Newbrain include extension from 32K to 64K RAM in the standard model and an extension of functions. The development of a possible 'Newbrain Mark II' could follow a parallel path.

For the time being, the Newbrain will continue to be produced in England, where the necessary know-how and technology are available. Until now 18,000 Newbrains have been sold, 4,000 are in the warehouse and parts are ready for the assembly of an additional 2,000. Obviously the Newbrain is no mass-market product; Tradecom doesn't aim at the mass market, but at distinct target groups.

Tradecom began 10 years ago with the development of a data entry system combining the Triumph/Adler electric typewriter with an optical reader. Philips marketed the system with

Tradecom handling the technical aspects. The typewriters evolved into terminals and the terminals, in turn, into electronic work stations.

Tradecom grew into a systems-supplier and builder of computer networks. The firm recently completed a coax datacommunications network for the Nederlandse Aardolie Maatschappij, a joint venture of Shell and Exxon. The network is a 'multi-colour' solution, which connects diverse computer systems both inside and outside the company.

It has also developed an advanced network module which allows the link-up of 16 Newbrains; a configuration that lends itself especially to the field of education.

'We're a real technical club', Mr van der Schier says of his 22-man team. 'Up to now, we've even done without a sales representative. Customers flock to us for the service we give.'

But after all the turmoil, van der Schier's first priority is to normalise matters and restore faith in the Newbrain.



Jack van der Schier, Tradecom director: 'We're a real technical club.'



Ferranti Computer Systems hopes to have Concurrent CP/M and MSDOS running on its Pro-Personal Computer by the end of the year, and to make the system multi-user soon after that. The basic £2,800 PPC Model 10 comes with VDU, two 320K floppy disks and F-COS 86 — Ferranti's own version of CP/M which includes Basic. Top of this business range is the £5,845 PPC Model 40 which comes with 20Mb Winchester and 1Mb floppy disk as back-up. Ferranti can be contacted in Manchester on 061-499 3355.

## Type a Telex

Prestel users can now send telexes to anywhere in the UK for only 50 pence using their Prestel sets or microcomputers with a Prestel adaptor.

The new service is an extension to the Prestel mailbox service. The sender receives confirmation that

the telex was delivered by a message in their Prestel mailbox.

Unlike the normal telex service the Prestel-telex link is not interactive. You can't have a telex conversation with the person at the other end of the line nor can you receive telex messages yourself.

Further information can be obtained from Prestel page 6018.

# Tandy Model 4 gets CP/M

Tandy Model 4 owners can now run the popular CP/M 2.2 operating system on their micro.

Montezuma Micro, which has done the adaptation work on Digital Research's CP/M, has included a number of utilities with the DOS. The first is INTERCHANGE, a utility that allows the reading, writing and copying of 20 different manufacturers' disk formats.

Also included is a utility similar to Memdisk used by TRSDOS/LDOS 6.0. The utility is called Memlink, and you need 64K RAM in your machine before it will be of much use.

Selling at £171.35 CP/M 2.2 on the Tandy 4 supports an 80x24

video, plus inverse video and direct cursor addressing. The function keys on the Model 4 are also utilized.

The format utility allows for a number of disk formats to be constructed and packages like Wordstar and Calcstar are now available formatted for the Model 4, using CP/M 2.2.

At £44.85 you can also buy Toolbelt for the Model 4, which is an extensive version of Toolbox already available for the Model I and III.

Montezuma Micro's software is marketed in this country by Molimerx.

Contact them on 0424-220391.

## ELIMINATE FAULTY CASSETTES

DataClone is the first company in the UK established specifically for the duplication of data cassettes.

All other duplicating houses are audio oriented — only DataClone has a duplicating system designed from scratch purely to handle computer information.

The result?

Greatly improved reliability in data transfer rates from 300 to beyond 2400 baud — previously unattainable.

All formats catered for. Quantities from 200 to infinity.

Contact us now for brochure.

DataClone — the first specialist service for computer cassettes.

**DATACLONE HAS  
EXPANDED, PRODUCING  
AN EVEN FASTER  
TURNAROUND. NOTE  
NEW ADDRESS.**



**DATACLONE**  
UNIT 1  
ROSLIN SQUARE  
ROSLIN ROAD  
ACTON, LONDON W3

TEL: 01-993 2134  
TELEX: 21879

# PCN Charts

This top 30 games list is compiled from both independent and multiple sources across the nation. It reflects what's happening in high streets in the two weeks up to October 27 and, like the micro charts, does not take account of mail order sales. The micro charts this week show the number of machines sold in the same two-week period so they tell the story in the high street between October 14 and October 27.

## GAMES

### Top Thirty

	GAME TITLE	PUBLISHER	MACHINE	PRICE
▲ 1 (2)	Kong	Ocean	Spectrum	£5.95
▲ 2 (6)	Manic Miner	Bug Byte	Spectrum	£5.95
▼ 3 (1)	Jet Pac	Ultimate	Spectrum	£5.50
▶ 4 (4)	Zoom	Imagine	Spectrum	£5.50
▲ 5 (8)	Hobbit	Melbourne	Spectrum	£14.95
▼ 6 (5)	Penetrator	Melbourne	Spectrum	£6.95
▲ 7 (10)	Harrier Attack	Martech/Durell	Oric	£7.95
▼ 8 (3)	Flight	Psion	Spectrum	£5.95
▲ 9 (30)	Gridrunner	Llamasoft	CMB64	£7.95
▲ 10 (13)	Arcadia	Imagine	Vic 20	£5.50
▲ 11 (21)	Devil of the Deep	Shepherd	Spectrum	£5.95
▼ 12 (11)	Jumbo Jet Pilot	Thorn/EMI	Atari	£29.95
▼ 13 (9)	Horace and the Spiders	Psion/Melbourne	Spectrum	£5.95
▲ 14 (27)	Hover/Bovver	Llamasoft	CBM 64	£7.50
▲ 15 (17)	Zip Zap	Imagine	Spectrum	£5.50
▲ 16 (—)	Golf	C/Rentals	Spectrum	£5.95
▲ 17 (—)	Scrabble	Psion/LG.	Spectrum	£5.95
▲ 18 (19)	Football Manager	Addictive	Spectrum	£5.95
▼ 19 (16)	Yomp	Virgin	Spectrum	£5.95
▲ 20 (23)	Tranz AM	Ultimate	Spectrum	£5.50
▲ 21 (—)	3D Deep Space	Postern	Acorn	£8.00
▲ 22 (24)	Monsters in hell	Softek	Spectrum	£6.00
▼ 23 (22)	Xenon 1	LJK	Oric	£8.50
▲ 24 (—)	Xadom	Quicksilva	Spectrum	£6.95
▼ 25 (18)	Hall of Things	Crystal	Spectrum	£7.50
▲ 26 (—)	Blue Max	Synapse	Atari	£27.95
▲ 27 (—)	Cookie	Ultimate	Spectrum	£5.50
▼ 28 (20)	Heathrow ATC	Hewson	Spectrum	£5.50
▼ 29 (13)	Pool	CDS	Spectrum	£5.95
▲ 30 (—)	Hunchback	Superior	Acorn	£7.95

## LLAMASOFT!! awesome games software



VIC 20  
CBM 64  
ATARI  
SPECTRUM

NOW IN BOOKS, LASKEYS &  
MANY RETAILERS. OR FROM  
49 MT. PLEASANT, TADLEY, HANTS

TEL. 07356 4478

# PCN Charts

Neither mail order nor deposit-only orders are included in these listings. The prices quoted are for the no-frills models and include VAT. Information for the top-selling micros is culled from retailers and dealers throughout the country and, like the games, is updated every alternate week.

PCN Charts are compiled exclusively for us by MRIB (Computers), London, (01) 408 0250.

## HARDWARE

### Top Twenty up to £1,000

MODEL	PRICE	DISTRIBUTOR
▶ 1 (1) Spectrum	£99	(SI)
▶ 2 (3) CBM 64	£229	(CO)
▲ 3 (4) BBC B	£399	(AC)
▼ 4 (2) Vic 20	£140	(CO)
▲ 5 (6) Texas/99/4A	£99	(TI)
▼ 6 (5) Oric 1	£99	(OR)
▶ 7 (7) Dragon 32	£170	(DD)
▲ 8 (9) ZX 81	£45	(SI)
▲ 9 (12) Atari 400	£150	(AT)
▼ 10 (8) Atari 800	£300	(AT)
▶ 11 (11) Colour Genie	£168	(LO)
▼ 12 (10) Sharp MZ80A	£349	(SH)
▲ 13 (14) Aquarius	£70	(MA)
▲ 14 (15) Lynx 48/96	£225	(CA)
▲ 15 (16) CGLM 5	£150	(SO)
▲ 16 (17) Sharp MZ700	£240	(SH)
▶ 17 (20) Apple IIe	£969	(AP)
▶ 18 (18) Epson HX20	£472	(EP)
▶ 19 (19) Nascom 3	£349	(NA)
▼ 20 (13) Tandy Colour	£240	(TA)

### Top Ten over £1,000

▲ 1 (2) Act Sirius	£2,525	(ACT)
▶ 2 (1) IBM PC	£2,390	(IBM)
▲ 3 (10) Apple III	£2,780	(AP)
▼ 4 (3) DEC Rainbow	£2,714	(DEC)
▶ 5 (4) Commodore 8000 series	£1,200	(CO)
▲ 6 (7) Epson QX10	£1,995	(EP)
▶ 7 (5) HP86A	£1,438	(HP)
▶ 8 (8) British Micro	£1,495	(BM)
▼ 9 (6) Olivetti M20	£2,400	(OL)
▼ 10 (9) Ajile	£2,995	(AJ)

AC — Acorn Computers. ACT — ACT. AJ — Anderson Jacobson. AP — Apple Computer. AT — Atari International. BM — British Micro. CA — Commodore. CB — Digital. DR — Dragon Data. EP — Epson. HP — Hewlett Packard. IBM — IBM. LD — Lowe Electronics. LL — Lucas Logic. MA — Mattel. OL — Olivetti. OR — Oric. SH — Sharp. SI — Sinclair. SO — Sord. TA — Tandy. TI — Texas Instruments.

## WOODLAND SOFTWARE

WIZARDRY — THE ULTIMATE GAMING EXPERIENCE FOR THE APPLE!!  
 WIZARDRY (The Praying Grounds) £32.95  
 KNIGHT OF DAMOCLES (The 2nd scenario) £28.95  
 Requires characters generated in the first scenario.  
 LEGACY OF ULLGAM (The Intergalactic — in USA format) £27.95  
 Requires characters from the first or second scenarios.  
 WIZARDRY Character personality £18.95

MORE FOR THE APPLE  
 AE (Arcade) £29.95  
 Auld (2nd Ed.) (Wargame) £29.95  
 BANCK'S (Arcade) £24.95  
 BOLD (Arcade) (Breeding combat game) £29.95  
 BOLD (Arcade) £29.95  
 COMBALLY (Wargame) £29.95  
 CRIME WAVE (Arcade) £14.95  
 DARK CRYSTAL (Adventure) £27.95

DEADLINE (Adventure) £35.95  
 FIGHTER COMMAND (Wargame) £29.95  
 FIFTEEN (Arcade) £17.95  
 HI-RES COMPUTER GOLF 2 (Simulation) £24.95  
 JUNGLE (Adventure) £21.95  
 LOCKER PLANNER (Arcade) £21.95  
 NORTH ATLANTIC '86 (Wargame) £29.95  
 NORTH ATLANTIC '86 (Wargame) £29.95  
 PLANETALL (Adventure) £29.95  
 SAMMY (Arcade) £21.95  
 SHOOT 'EM UP IN SPACE (Wargame) £27.95  
 SHOOT 'EM UP IN SPACE (Wargame) £27.95  
 TIME ZONE (Adventure) £34.95  
 U.S. TANKS (Arcade) £29.95  
 WITNESS (Adventure) £35.95  
 ZANON (Arcade) £29.95

ADVENTURE ON THE IBM PC £27.95  
 DARK CRYSTAL £29.95  
 PLANETALL £29.95  
 SUSPENDED £29.95  
 WITNESS £29.95  
 ZORK'S (I & II) £29.95

WAR ON THE ATARI  
 BATTLE FOR MANKY disk-cass £29.95  
 BATTLE FOR MANKY disk-cass £29.95  
 CLOSE ASSAULT disk £21.95  
 EASTFRONT disk-cass £21.95  
 KNIGHTS OF THE DESERT disk-cass £29.95  
 LEGIONNAIRE disk-cass £29.95  
 TANKS disk-cass £29.95  
 TANKS disk-cass £29.95  
 TIGERS IN THE SHOW disk-cass £29.95

Please add 15% VAT — Post & Packing FREE. Personal callers by appointment only — 24 hours service 7 days a week!

All titles are disk based unless stated otherwise. A full list of what we have available is free upon request.

Woodland Software, 103 Oxford Gardens, London W10 6NF Telephone: 01-960 4877



## PROGRAMMERS

Softek is continuing its search to the furthest outposts of the galaxy for Superstars of Machine Code Programming to expand its force of Game Masters. (Particularly for Spectrum, CBM 64 and the Acorn Electron)

In return we will offer formidable outright payments or the potential of achieving No 1 Slot in the Charts & possible royalty payments of the plastic proportions of £50,000 a year or more!

If this is you then phone immediately or write to...

SOFTEK INTERNATIONAL LTD.

12/13 Henrietta Street Cover Garden London WC2H 8JH  
 Tel: 01 240 7877

### WHAT THEY SAID AT THE PCW SHOW ...

"Very impressive graphics"  
 Tim Hartnell, author of many best selling micro books  
 "A blimmin' good maze zap"  
 Jeff Minter, top Vic 20 & CBM 64 games programmer  
 "Very smooth ... I'll have one"  
 Andrew Pannel, author of 'Mastering Your ZX Microdrive'  
 "Better than what Ultimate is doing"  
 A major UK games dealer  
 to name but a few who saw ...

## WILD WEST HERO

Now you can enjoy the game that the experts loved

Wild West hero captivated you in the fastest, meanest noisiest battle you will ever experience in these times. Up to 80 bandits will challenge you on each wave, all on the screen at once, all smooth, all in hi-resolution graphics, see the right hand column for full spec.

For the 48K Spectrum

Wild West hero uses full colour graphics, hi-res, smooth movement, dramatic sound effects, 100% machine code, high score, two play option, compatible with Kempston or Downsway joystick interface.

All Timescape products are guaranteed for life, if our software ever fails to load return the cassette for an instant replacement.

All orders despatched within 24 hours of receipt of order.

ONLY £5.90 INC. VAT & POSTAGE



1 VIRGINIA GARDENS, FAIRWAYS

MILNGAVIE, GLASGOW G62 6LG

Telephone: 041-956 5058

# KEENEST PRICES ★ PROMPT RELIABLE SERVICE ★ that's **Twillstar!** ★

Just look at our prices and selections; but if you don't see what you want please telephone us, as we are unable to list all the items we stock. We will be more than pleased to give you our Best price.

## MICROCOMPUTER

Model B .....	£399
Model B & Disk Interface .....	£469
Model B & Econet .....	£446
Model B & Econet & Disk Int. ....	£516
Disk Interface Kit .....	£97
Torch Disk pack .....	£943
Teletext Receiver .....	£225

## FITTING SERVICES AVAILABLE

NOW AVAILABLE — THE ACORN ELECTON ONLY .....

## WORD PROCESSORS

View Word Processor .....	£59
Word Wise Processor .....	£45

## DOT MATRIX PRINTERS

Shinwa CP80 F/T .....	£289
Epson FX80 F/T .....	£425
Epson RX80 P/T .....	£315
Epson FX100 P/T .....	£499

## DAISYWHEELS

Juki 6100 Daisywheel with 2K Buffer .....	£395
Silver Reed Printer/Typewriter inc. RS232 Interface EX43 & 2K Buffer (Just plugs into your BBC) ...	£369

## MONITORS/TV'S

Philips 2006 14" col. TV/Monitor .....	£255
Microtec 14" 1431 .....	£287
Sanyo 14" .....	£228
Luxor 14" .....	£565
BBC Official 12" .....	£95
New Phnix Green Screen 12" .....	£89

## BBC COMPATIBLE DISK DRIVES

### Single Drives 5 1/4"

100K-40 Track .....	£169
200K-40 Track Double sided .....	£215
200K-80 Track .....	£215
400K-80 Track Double sided .....	£269

### Dual Drives 5 1/4"

200K-80 Track .....	£339
400K-40 or 80 Track Double sided .....	£425
800K-80 Double sided .....	£550
Power Supply .....	£40

## CASSETTES

### BBC Compatible

New Sanyo Slim 3 .....	£29
Official BBC Cassette Recorder .....	£29.95

★ SERVICE CONTRACTS TO EDUCATION AUTHORITIES AT DISCOUNT

★ OFFICIAL ORDERS FROM DEALERS, GOV. DEPTS, COLLEGES AND SCHOOLS WELCOME.

## HOW TO ORDER

You may purchase any of the items listed below by cheque, Barricard or Access. All you have to do is fill in the details in the coupon below and list your requirements on a separate sheet of paper. Post to us and we will dispatch within 7 to 14 days. All prices inclusive of 15% VAT. Add £2.50 P&P for orders below £150 over, add £8 P&P.

## TELEPHONE ORDERS

(01)- 574 5271

Credit card holders may order by telephone. Give Card No. Name, Address and item required. Credit cards valid if signed by card holder. Address below must be the same as card holder.

Post to: TWILLSTAR COMPUTERS LTD,  
17 REGINA ROAD, SOUTHALL, MIDDLESEX.

I have enclosed my list of requirements along with my cheque/P.O. for £ .....

I prefer to pay with my ACCESS-BARC-LAYCARD  
(Delete whichever not applicable)

CARD NO .....

SIGNATURE .....

NAME .....

ADDRESS .....

TEL (Day) .....

TEL (Eve) .....



## TWILLSTAR COMPUTERS LTD

17 REGINA ROAD, SOUTHALL, MIDDLESEX. TEL: (01) 574 5271.

(OPEN SIX DAYS A WEEK — 10 a.m. to 8 p.m.)

# DON'T MISS : Bristol's First Personal Computer and Technology Show

## BRISTOL EXHIBITION CENTRE

11th, 12th & 13th of November 83

OPEN FRI & SAT 11am - 9pm; SUN 11am - 6pm

ENTRANCE - ADULTS £1-50; CHILDREN 80p

See: B. B. C, Spectrum,  
Electron, Memotec,  
Atari, Computer  
Clubs, Trade Stands,  
Books, Software —  
Games, Educational,  
Business and lots  
more.



For full details contact  
Bristol (0272) 650465

## Ergonomics for micro addicts

I have just come across Mr Charles Hardy's letter in *PCN* No 27, which included a cry for help for relief from micro-headaches. Are these perhaps a symptom of micro-hangovers suffered by microholics?

The answer must lie in micro-Ergonomics. There are two common causes of headaches associated with using micros for any length of time, neither of which has anything to do with radiation from the front of any standard TV or monitor screen, so let's kill that old chestnut here and now.

One cause of headaches is tension in the spinal muscles in the neck region, up to where they are attached to the base of the skull. The main reason for this is poor posture due to incorrect 'workplace' design. If the keyboard is too high, you will find that you are tending to lift your shoulders up in order to get your forearms horizontal (try it!). This in turn induces tension in the neck muscles; consciously lowering the shoulders occasionally will help to relieve it. However, prevention is better than cure, so let's get some ergonomics into your workplace.

### PCN £10 Star Letter



If you are sitting comfortably at the right height, thighs more or less level and back leaning backwards by 5° or so, then the keyboard should be positioned so that it can be used with the forearms horizontal (shoulders down).

The second main cause of headaches is associated with the eyes. They do not like flickering displays, nor displays too close to the eyes, nor being focused at a fixed distance for too long. Older eyes find these more of a problem than younger eyes. The points to remember are: try to reduce the flicker if possible by careful tuning; move the TV/monitor further away (from 1m to half-way across the room — leads permitting — is fine if you can still read the display



## Don't carry a LOAD on your shoulders, unburden yourself on *PCN's* letters page.

clearly); and every so often try the old cricketers' eye exercise trick — hold a finger a foot in front of the face and focus rapidly between this and something at the far side of the room several times until it is no longer a strain. The general rule is that if any muscles (eye or shoulder/neck) are kept still under tension for too long, they will fatigue and start to ache.

I hope these guidelines will help not just Mr Hardy (who I'm sure isn't a nutcase), but others who may have the same problems and never realised that Ergonomics isn't just a matter of keyboard!

Andrew G. McNicholl  
Burton-on-Trent, Staffs

*Thanks to everyone who wrote with 'cures' for Mr. Hardy's ailment. This one covered the main points made. — Ed.*

## Deprived Dutch look to the UK

I would like to respond to the letter sent in by L. Schulting (*PCN* issue 30).

The high prices of software here in the Netherlands are a result of the high import prices.

I would also like to comment on the appalling lack of software available here. If I want to buy a software cassette I must travel at least 50 miles to find a shop that sells about one third of the software available in most English computer shops.

Funnily enough, the cheapest way of buying software is by means of mail order companies in the UK.

By the way, if anyone knows of a computer club near me,

please contact me at Anton Mauvestraat 10, 5831 XV, Boxmeer, N Brabant.  
S Foster,  
The Netherlands.

## Poetic plea for accuracy

Dear Ms Editor, what have you done?

You reduced the price of the BBC B and off to STATACOM I run. This was the moment I had long awaited as pennies to me mean so much. What a shock I received on arrival at Sutton when I discovered an error had been done.

So back to my Video Genie I went and fed in my 'Word for Word', as a few lines to the Editor were called for I thought,

I decided to take the plunge. If the BBC B was still out of my reach I'd enquire just how long it must be,

before programs for my Genie by *PCN* boffins could be printed for us all to see.

Seriously, being an 'oldie' and possessing a bus pass, I would appreciate any help that can be given, particularly with regard to programming, and I am delighted that you should have started a beginner's course on this subject.

E. John Welton,  
Sutton, Surrey

*Whoops — an outbreak of slipping digits. Sorry to raise your hopes, but how about sending us a Genie program for Program Cards? — Ed.*

## Communications standards exist

I refer to your note on the fact that three 'big names' in the US micro business hope to establish a standard set of protocols for micro users, and charge \$2,500 for the privilege of using it (*PCN* issue 26).

Your readers may be interested to know there is already a 'de facto industry standard' for the transfer of files between micros. It is based on work by Ward Christiansen and is referred to as the 'CP/M protocols', 'X Modem protocols' and even 'Christensen protocols'. It started with W Christiansen's MODEM.COM series for CP/M systems but has become widely used by others on TRS 80, Apple and Atari.

Details of the protocols can be obtained from bulletin boards which support them for download — CBBS NE, Liverpool Mailbox, London TBBS, Forum 80 Hull etc.

The protocols include handshaking, check sums and automatic repeat and error facilities, and work very well for transferring files between quite different types of micro, either directly or via modems.

Peter Tooull,  
Liverpool.

## TV aerial sockets can't cope

In reply to Ralph Rapley (*Issue 33*), there is a possibility of damage to a TV set when used with a computer that is often overlooked. That is the fact that TV aerial sockets are not made for constant plugging and unplugging as they are quite flimsy. The solution to this is to make or buy a short extension cable. This has the added advantage that it will no longer be necessary to grope around behind the TV set when changing cables.

R G Daniels,  
London

Share your thoughts in the UK's liveliest micro weekly letters columns. Funny, feisty or fanciful, your letter could win you £10 if it's of star status.

**WRITE TO:** Random Access, Personal Computer News, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

Lost in a maze of bits and bytes, trapped in a forest of errors, bugged by Basic? Whatever the problem, CALL on us. Our panel of experts is at your command.

**Write to:** Routine Inquiries, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

## A symphony of sound on the BBC

**Q** PCN Micropaedia, sound part four in issue 20 showed the oscillogram of a clarinet. I would like to know if you could attach a microphone to the BBC microcomputer to produce the same result on the screen and then be able to take the result and convert it into envelope and sound statements automatically.

R K Reading, *Birchington, Kent*

**A** Yes, it is possible to attach a microphone to the BBC. The easiest way of doing this is to attach a high impedance microphone (50K ohm) directly into one of the analogue to digital converter (A/D) channels at the back of the machine. This will not give very good quality due to differences in the impedances between the microphone and the A/D. Ignoring this fact, the A/D can then be read with the ADVAL command and some experimenting can be done.

What is coming in through the microphone is a continuously varying voltage. This needs to be sampled at as high a rate as possible. Basically, sampling means taking a series of measurements at a set number of times per second. This sampling rate needs to be as high as possible, in fact at least twice the highest frequency to be sampled.

For audio frequencies this means taking measurements at least 40 thousand times a second. The drawback is that the A/D converter only performs a conversion every 10msec. This gives a maximum sampling frequency of 100 times a second and so the highest frequency that can be monitored accurately, is about 50 Hz. To improve on this it is necessary to use an A/D converter that can convert at a higher rate, and for practical purposes this means a conversion every 20 microsec. This can be done by attaching a separate high speed A/D through the 1 MHz bus.

Once there is a signal coming

into the computer, it needs to be stored. The best way to do this is to put consecutive samples into an array. For example using the ADVAL command:  
 10DIM V%(1024)  
 20FOR T%=0 TO 1024  
 30V%(T%)=ADVAL(1)  
 40NEXT  
 50MODE 0  
 60FORT%=0 TO 1024  
 70PLOTS T, V%(T%)  
 80NEXT

This will plot out the volume or amplitude levels of whatever was coming into the microphone when lines 20 to 40 were executing. This is a bit rough and ready but should work, but only really for frequencies below 50 Hz. To convert this into something more useful, such as a set of frequencies you would need a Fast Fourier Transform (FFT). This algorithm is way beyond the scope of this reply, but various examples of the FFT can be found in the electronics journals.

Imitation of a musical instrument, such as the clarinet referred to in the above letter, can be accomplished in two main ways. The first is to take a set of samples of a note of the instrument, at a high enough frequency, and then just push these out through a Digital to Analogue converter (D/A), this is a device which does exactly the opposite of an A/D and could be fairly easily attached to the user port.

To alter the frequency of the note, the set of samples would need to be played back at a faster or slower rate than the recorded sample, just like slowing down or speeding up a record. This has the drawback that you first of all need a D/A and secondly the faster and slower versions of the original will not be accurate.

The second method requires the computer to simulate the instrument using a set of sound and envelope generators. This is a lot more complicated and requires a great deal of processing from the computer. The other problem with this method is that a musical instrument does not produce one frequency, it produces a whole set combined to produce the required tone. This means that the computer needs to be attached to a very clever set of sound chips.

But don't despair, as there

are a number of add-ons that can be attached to your computer to do the work for you. Remember though that you will pay more for higher quality sound.

## Oric acting out of character

**Q** Could you please tell me how to move a character vertically up or down the screen of my 48K Oric in 6502 assembly language. Although this is simple enough in Basic I cannot seem to achieve the same effect in machine code.

M. Y. Sutton, *Swansea*

**A** One way of tackling the problem is to use 2 bytes in the 0 (zero) page of RAM to hold the position of the character you want to move. This will be relative to the screen start and can be found by multiplying the object's row value by its column value. Adding these to the HIREs screen origin (40960) gives its exact location in RAM.

The reason for using the zero page is that there are a set of 6502 op codes which are especially designed for 'zero page (0—FF) indirect' usage and which make this sort of operation easier. You could use address #0021 and #0022 as these are normally used for DEF USR related sequences, so are unlikely to be affected by an all machine code program.

To move your character, you'll have to work out the op codes to do the following: load the accumulator with the ASCII value of the character, using an indirect load from the address given in #21 and #22 and replace the character with a blank (*ie* where the object is). This may be tricky if you have different PAPER colours on the screen. Next, you have to update the contents of #21 and #22 using the following table; the star shows where the object is to be moved from.

```

-41  -40  -39
-1   *   +1
+39  +40  +41
    
```

Here you have to add the appropriate value to #21 and #22, according to the direction in which you want the object to travel. Finally, you simply

dump the contents of the accumulator into the new memory location pointed to by the two bytes #21 and #22.

Of course, you'll have to add in routines to make sure that you don't run off the screen and have your character running wild through RAM, and inevitably causing a crash. Moreover, if you're using the Oric's serial attributes to give your character some colour, you'll have to move these as well to the left and possibly the right of its new location.

## Ambivalence about Spectrum add-ons

**Q** I own a Spectrum 48K and wish to fit a joystick interface. Is the new Interface 2 from Sinclair compatible with much cassette based software, and if so which?

I also wish to know if there is an add-on typewriter keyboard available that won't affect the fitting of any peripherals such as Microdrives. If not, are separate keyboards available?

Richard Styles, *Dover, Kent*

**A** The general answer to your question is, no. Interface 2 will not work with quite a considerable body of cassette based software. Kempston has been making considerable strides towards getting manufacturers to accept its joystick as an industry standard, so there's a large body of software that is Kempston compatible, and currently will not work with Interface 2. A Kempston spokeswoman tells us that there are no current plans to change this situation.

However, it's likely that Interface 2 will become a standard for new manufacturers, and other existing manufacturers are likely to take steps to allow their games and joysticks to work with it. You'll therefore see things improve as time goes by.

Keyboards are also currently in a state of flux. The Fuller keyboards will apparently take Interface 1 inside, so you shouldn't have problems there, apart from delivery dates, and the Mukbus keyboard is being redesigned to accommodate Interface 1. There's currently heavy demand for keyboards, though, so you may have to wait a while.



27th Century Salamander  
presents

# GRIDRUNNER

ON THE GRID ONLY DROIDS CAN  
HEAR YOU SCREAM!



NOW SHOWING  
AT A DRAGON OR  
SPECTRUM NEAR YOU

*Awesome original awesome screenplay and  
Llamas by Jeff Minter.*

## STARRING

**Hank Hunk** as the Grid Pilot **Truly Scrumptious** as the Blonde  
and **Ivor Notion** as the Mad Professor

*with supporting cast* – Mungo Martin – Nibs Norman – Nimrod Cain – Damien Danvers  
*featuring* X, Y Zappers, Mutating Pod, and a cast of thousands (mostly droids)  
and introducing **Gloria Goofbuns** as the Lady Astarte

**Gridrunner £7.95.** Please add 50p p&p to all orders *Dragon version only.* Send A5 SAE for full catalogue.

**Direction:** This, and other remarkable productions, are available at  
selected branches of Boots, and other computer dealers nationwide,  
or direct from.

● Spectrum versions  
marketed by **Quicksilver**.

# Salamander SOFTWARE

Salamander Software, 17 Norfolk Road, Brighton BN1 3AA

COMING SOON from the same awesome team:

## LASER ZONE

quality software for the Dragon 32, Oric-1 and BBC Model B microcomputers.

Scaled a new PEEK in microcomputing? If printed your tip will earn you a fiver.



If you've got something to crow about . . . a bit of magic that'll make the world a better place for micro users, then send it to PCN Microwaves—our regular readers' hints and tips page. We'll pay you £5 if we print it. We'll pay you even more if your little gem gets our vote as microwave of the month. Think on . . . and write to Microwaves, PCN, 62 Oxford Street, London W1A 2HG.

## Change the Colour Genie cursor

There are several ways of changing the cursor on the Colour Genie. Some of these are done by POKEing the following locations.

POKE 16410,71 will change the cursor to a line cursor, the same as on the BBC micro computer.

POKE 16410,1 will stop the cursor blinking.  
POKE 16410,72 will make the cursor disappear.

David Keely,  
Hungerford,  
Berkshire.

## Imprecise tip but useful technique

While experimenting with the filespec after the enter command on my Atari 800, I discovered that a filespec of *Kie ENTER"K."* allowed me to enter data directly into memory, without having it displayed on the VDU (the filespec *K* bypasses the editor).

So far I can think of no practical use for this, but the technique can be applied to the INPUT command with great benefit.

```
10 DIM A$(10)
20 OPEN #1,4,0,"K:"
30 INPUT #1,A$
```

When the above program is run, on reaching line 30, you can INPUT directly from the keyboard into *A\$*, with nothing appearing on the screen. This could be very useful for entering Prestel log on codes, or any security lock you may have in your program.

Mr B,  
Garston,  
Watford, Herts.

If Mr B could send us his full name, he will be able to receive his cheque.

## Commodore merger bid is finalised

The simple merger routine described in (*PCN, issue 32*) is not completely correct.

If you decrement the pointer at decimal 45, you have to bear in mind that this pointer really is a hexadecimal address (6502 style) low byte first (45) plus a high byte (46).

All goes well if decimal 45 contains a number greater than one. However, if it contains 1 or 0, you have to decrement the complete hexadecimal address to which the pointer is pointing. In other words you also have to decrement the high byte of the address.

So, if PEEK(45) gives a 1 you have to do this:

```
POKE 43,255:POKE44,  
PEEK(46)-1
```

Similarly, if PEEK(45) gives a 0:

```
POKE43,254:POKE44,PEEK  
(46)-1
```

For the CBM 64, locations 43 and 44 normally contain 1 and 8.

Fer Weber,  
Venlo,  
Netherlands.

## Oric-1 pointer one-liner

For Oric-1 owners who wish to move a pointer around for screen positioning, using the cursor keys, here is one line routine to do it.

```
K=ASC (KEY$+'0'):POKE  
#20E,
```

```
1:P=P+(K=8)-(K=9)+  
(K=11)*40-(K=10)*40
```

Note that POKE #20E, 1 reduces the auto-repeat delay down to a minimum.

B Masterson,  
Poole,  
Dorset.

## NOTeworthy function for Dragon 32

The logical function NOT isn't mentioned in the Dragon 32's manual, but it can be used.

Try the following program:

```
10 INPUT A
20 IF A THEN PRINT  
"A=TRUE"
30 IF NOT A THEN PRINT  
"A=FALSE"
40 GOTO 10
```

You will notice that for every integer value of *A* besides 0 and -1, *A* is both true and false simultaneously. But if *A* = 0 then *A* = 'false' and if *A* = -1 then *A* = 'true'. Now you can

verify that the statement *B=NOTA* is the same as *B=-(A+1)*. So *B=NOTNOT A* is the same as *B=A*, as it should be.

This means that you can use the function NOT in a very convenient way to set flags in your program.

Ruud Hoekzema,  
Utrecht,  
Netherlands.

## Atari characters walking tall

The following short program enables the Atari to print out characters at normal width and double height. There is one drawback though, and that is the characters are not as clear as they are in modes 0,1 and 2.

```
10DL=PEEK(560)+PEEK  
(561)*256+4  
20FORI=1 TO 14:POKE DL  
+I,5:NEXT I  
30SETCOLORI,8,12: SET  
COLOR2,8,12: SET COL-  
OR 4,8,5: PRINT  
CHR$(125)
```

Steven Hurst,  
Bolton,  
Lancs.

## Are you writing copy on your Oric?

On the Oric-1, the copyright symbol does not appear on the keyboard. It is, therefore, theoretically impossible to include it in a REM statement.

This may be overcome by typing out the desired line, and leaving appropriate spaces where the copyright symbol is to appear. By a process of elimination, plot at various points on the screen, CHR\$(96) until the symbol is in the correct space.

Then "COPY" over it so that when listed, the copyright symbol appears in the line.

A Hutton,  
Bromley,  
Kent.

## Commodore Basic in the NEWEd

The following machine code subroutine for the CBM64 will retrieve a Basic program once it has been NEWed.

To use it, type in the Basic program and RUN it, clear the memory by typing NEW. Now whenever you want to OLD a program you just enter SYS 53200.

This subroutine will not work

if, after NEWing the program, you enter a line of Basic or define a variable.

```
10 DATA 169,1,141,2,8,32,  
51,165,165,34,24,105  
20 DATA 2,133,45,165,35,  
105,0,133,46,76,94,166  
30 FOR I=53200 TO 53223:  
READ A: POKE  
I,A:NEXT I  
Martin Lightfoot,  
Worsley,  
Manchester.
```

## Playing your Oric drum kit

I have been exploring the Oric's sound and have at last come up with two basic drum sounds.

The first is: PLAY 80,23,65,100 which produces a sort of snare drum sound.

The second is: PLAY 20,40,65,100 which produces a bass drum sound. Using both of these you can try:

```
10 PLAY 20,40,65,100  
20 WAIT 40  
30 PLAY 80,23,65,100  
40 WAIT 20  
50 PLAY 20,40,65,100  
60 WAIT 20  
70 PLAY 20,40,65,100  
80 WAIT 40  
90 PLAY 80,23,65,100  
100 WAIT 40  
110 GOTO 10  
Mr G Hill,  
Exeter, Devon.
```

## Cassette Revelations

On the Oric-1, if you record many programs onto a tape but lose or forget their names, then finding them again can be rather slow.

Poke in the following machine code program (remember the numbers are HEX so precede them with a hash) or, if you have one, use an assembler.

```
Address Mcode Mnemonics  
400 A949 LDA #49  
402 A000 LDY #00  
404 20EDCB JSR CBED  
407 60 RTS
```

A Basic loader follows:

```
10DATA  
A9,49,A0,00,20,ED,CB,60  
20FOR T=#400 TO #407  
30READ A$  
40POKE T,VAL("E"+A$)  
50NEXT T
```

Now use CLOAD™ to load a program.  
K L Gillatts,  
Woodley,  
Reading.

# DSS Discount Software Supplies

8 PORTLAND ROAD, LONDON W11 4LA 01-221 1473

**AMAZING SOFTWARE BARGAINS BY MAIL, 100's OF TITLES AVAILABLE!  
TELEPHONE ORDERS WELCOME. WRITE OR RING NOW FOR FULL DETAILS**

<b>SPECTRUM</b>				<b>COMMODORE 64</b>			
Name	Supplier	RRP Inc. VAT	Our Price Inc. VAT	Name	Supplier	RRP Inc VAT	Our Price Inc VAT
Manic Miner	Bug Byte	5.50	4.50	Kong 64	Anirog	7.95	6.99
Spectres	Bug Byte	5.95	5.20	Scramble 64	Anirog	7.95	6.99
Styx	Bug Byte	5.95	5.20	Frog Run 64	Anirog	5.95	4.95
Pool	Bug Byte	5.95	5.20	3D Time Trek	Anirog	5.95	4.95
Aquarius	Bug Byte	5.95	5.20	Cyclons	Rabbit	5.99	4.99
The Castle	Bug Byte	6.95	5.99	Centrapods	Rabbit	5.99	4.99
Zip Zip	Imagine	5.50	4.49	Monopolee	Rabbit	5.99	4.99
Arcadia	Imagine	5.50	4.49	Annihilator	Rabbit	5.99	4.99
Zzoom	Imagine	5.50	4.49	Pakaluda	Rabbit	5.99	4.99
Shizoids	Imagine	5.50	4.49	Panic 64	Interceptor	7.00	5.99
AM Diddums	Imagine	5.50	4.49	Crazy Kong	Interceptor	6.95	5.95
Jumping Jack	Imagine	5.50	4.49	Star Trek	Interceptor	6.95	5.95
Moiar Maul	Imagine	5.50	4.49	Frogger	Interceptor	6.95	5.95
Penetrator	Melbourne House	6.50	5.95	Sprite Man	Interceptor	6.95	5.95
Terror Dackbill 4D	Melbourne House	6.50	5.95	Attack of			
Robon	Softek	5.95	4.95	Mutant Camels	Llamosoft	7.50	6.50
Firebirds	Softek	5.95	4.95	Matrix	Llamosoft	7.50	6.50
Repulsar	Softek	5.95	4.95				
Transylvanian Tower	Richard Shepherd	6.50	5.25	<b>VIC 20</b>			
Everest Ascent	Richard Shepherd	6.50	5.25	Arcadia	Imagine	5.50	4.75
Super Spy	Richard Shepherd	6.50	5.25	Wacky Waiters	Imagine	5.50	4.75
Devils of the Deep	Richard Shepherd	6.50	5.25	Catcha Snatcha	Imagine	5.50	4.75
Invincible Island	Richard Shepherd	6.50	5.25	Frantic	Imagine	5.50	4.75
Hall of the Things	Crystal	7.50	6.50	Cosmiads	Bug Byte	7.00	5.99
Rommels Revenge	Crystal	7.50	6.50	Vic Panic	Bug Byte	7.00	5.99
The Dungeon Master	Crystal	7.50	6.50	Vic Asteroids	Bug Byte	7.00	5.99
Invasion of the				Crazy Kong	Interceptor	6.00	5.25
Body Snatcha's	Crystal	7.50	6.50	Jupiter Defender	Interceptor	6.00	5.25
Shark Attack	Romik	5.99	4.99	Vic Rescue	Interceptor	6.00	5.25
Colour Clash	Romik	7.99	6.99	Animatter Splatter	Rabbit	5.99	4.99
Spectra Smash	Romik	6.99	5.99	Paratrooper	Rabbit	5.99	4.99
Jet Pac	Ultimate	5.50	4.50	Cyclons	Rabbit	5.99	4.99
PSST	Ultimate	5.50	4.50	Skramble	Rabbit	5.99	4.99
Cookie	Ultimate	5.50	4.50				
Tranz AM	Ultimate	5.50	4.50	<b>ATARI</b>			
Atic Atac	Ultimate	5.50	4.50	Krazy Kopter	English Software	14.95	10.99
Lunar Jet Man	Ultimate	5.50	4.50	Time Warp	English Software	14.95	10.99
Astron	DK Tronics	9.95	8.75	Air Strike	English Software	14.95	10.99
Fruit Machine	DK Tronics	4.95	4.49	The Time Machine	Channel 8	9.95	8.95
				Circus	Channel 8	9.95	8.95
				The Golden Baton	Channel 8	9.95	8.95
				<b>ORIC</b>			
				Sea Harrier Attack	Durrell	6.95	5.95
				Lunar Lander & Asteroids	Durrell	6.95	5.95
				Galaxians	Softek	6.95	5.95
				Super Meteors	Softek	6.95	5.95
				Xenon	LJK	8.50	7.50
				Invaders	LJK	7.50	6.50
				<b>BBC</b>			
				The Music Processor	Quicksilva	14.95	13.25
				Protector	Quicksilva	7.95	6.95
				Wizard	Quicksilva	6.95	5.95
				Games Compendium	Salamander	6.95	5.95
				Tanks	Salamander	7.95	6.95
				Dragon Rider	Salamander	7.95	6.95

## DRAGON 32

Backgammon	Microdeal	8.00	6.99
Shuttle	Microdeal	8.00	6.99
Frogger	Microdeal	8.00	6.99
Textstar	PSS	12.95	11.50
Draw Bug	PSS	12.95	11.50
Flight Simulator	PSS	7.95	6.95
Grand Prix	Salamander	7.95	6.95
Night Flight	Salamander	7.95	6.95
Monsters	Softek	7.99	6.95
Strategic Command	Romik	9.99	8.75

## INCREDIBLE SPECIAL OFFER!

**THE HOBBIT + BOOK FOR THE SPECTRUM**

RRP

**£14.95**

OUR PRICE

**£10.95**

TO: DISCOUNT SOFTWARE SUPPLIES PLEASE ACCEPT MY ORDER FOR THE FOLLOWING PROGRAMS/SPECIAL OFFERS

- .....
- .....
- .....
- .....
- .....

Make cheques payable to Discount Software Supplies

Cheque No ..... For £ ..... enclosed

Please debit my Access Card No ..... Note no Visa

Signed .....

**DISCOUNT SOFTWARE SUPPLIES**  
8 Portland Road, London W11

SEND

Name .....

Address .....

DSS is the trading name of Dovegate Ltd

SEND SAE FOR UP TO DATE LIST OF OUR AMAZING BARGAINS

David Guest explores the intricacies of a 'portable' business micro with a hard disk.

# Kaypro computing

Once there was a man called Adam Osborne who made an enviable fortune by producing an unassuming micro that could be carried around.

In the fullness of time others saw the possibility of following in his footsteps (which left a deep imprint, owing to the weight of his machine), and a number of "portable" micros appeared. One such was the Kaypro II, built by Non-Linear Systems (NLS), whose previous claim to fame has been a digital voltmeter.

Squire Osborne observed the Kaypro and declared it to be a flash in the pan.

And just as the Osborne Computer Corporation sought refuge from its clamouring creditors in the US bankruptcy laws, the Kaypro 10 arrived in Britain looking hale and hearty and unassuming except for its 10Mb Winchester disk. Nobody who carries this system about should ever have sand kicked in their face again.

In some respects NLS has borrowed from Osborne (transportability, conservative technology, bundled business software) and in others it has gone one better. The hard disk is the most obvious example and for the moment is what marks the Kaypro 10 out from all its competitors.

## Presentation

The 10 arrives in a Russian doll arrangement of cardboard boxes; the large outer box opens to reveal a smaller of uncomplacated construction. The smaller box contains the machine itself, sheathed in a plastic bag, and the documentation which is unaccountably sheathed in two plastic bags.

Also in the inner box is the mains lead. Ours sported an exotic plug looking as though it's intended for the Albanian national grid. NLS or its UK distributor CK Computers will probably attach a British three-pin plug to later shipments.

## Documentation

NLS gives away various items of business software with the 10 in addition to three Basics and CP/M 2.2. This makes for a substantial amount of documentation; if you're planning to carry the machine anywhere you might like to work out on the manuals first.

The main users guide is a pleasantly produced ring-binder that shouldn't give offence to the initiated or discourage the novice. To judge by its illustrations, NLS expects most users of the Kaypro 10 to be young women with frightening finger nails.

The system we reviewed came without the Perfect range of software that is promised to real users. Instead it had Wordstar, Suprterm and Microplan in addition to MBasic, CBasic, SBasic, CP/M, and Word Plus. This may become



Work out on the documentation first.

the standard offering — NLS has yet to decide.

The manuals for these are the software manufacturers' own documentation, which means that in some cases they assume knowledge of English.

NLS has produced a small additional booklet called Introduction to Software which may confuse people with its references to two diskette drives as the 10 has only one, with the hard disk safely out of harm's way.

## Construction

As befits the product of a digital voltmeter manufacturer the Kaypro 10 has a steely, angular solidity when closed. The Kaypro logo and some racy stripes relieve the greyness of the box, but the main concession to style doesn't appear until you unclip the keyboard from where it sits flush with the screen. In use the 10 is a very good looking machine; its casing forms a hood above the screen, giving it a strangely malevolent air.

The keyboard is a separate unit and it forms the base when the system is in transportation mode. The backplane has the carrying handle, ports and switches, and also four protrusions that might, given the duplication in the packaging, serve as back-up feet but are more likely to be a provision for rack-mounting.

The box measures 18in by 15in by 8in, and the whole package weighs 31lbs. It has yet more feet which serve the main unit in use and a hinged metal stand that tilts it to an angle for the user. This reviewer, no giant by any means, found the angle too shallow.

## Keyboard

Linked to the machine by a cord when in use, and by two clips in transit, the keyboard unit might be the crowning glory of this system if it wasn't for the fact that it is its base.

There's nothing special about the layout of the keys themselves, and they may offer too little resistance to appeal to all tastes, but the banked effect of the higher rows make this an exceptional keyboard to use.

The separate numeric keypad is not sculpted to the same extent but its 14 keys

have the distinction of being programmable. The four cursor control keys that surmount the main body of keys (another 62 in all) are also programmable.

The reset button, thoughtfully provided in red plastic, is well away from wayward fingers at the back on the machine.

## Screen

Anybody who has ever peered doggedly at the original Osborne screen for any length of time will appreciate the Kaypro 10's 9in display. There is still a strong temptation to lean into it and at times you feel as though you're looking through the wrong end of a telescope but that has more to do with the size of the fascia than the size of the screen.

It is green on black, 24 lines (plus a status line) of 80 characters, and has inverse video, blinking, underlining, and reduced intensity — unspectacular but functional.

The screen's most endearing feature is its pronounced persistence. The ghosts of characters linger on the screen as though they can't believe that the last refresh cycle has gone. Large graphics constructions disappear with particular reluctance.

As a business graphics system the 10's screen is 100 by 160 pixels. But the manual won't fill you with confidence: 'The Kaypro 10 has graphics capability. However it needs a program to tell it what to do . . . If you are not able to write the programs and want to use the Kaypro 10 graphics capability for business or other purposes, then (Note the if . . . then) it is best to find someone to write a program to do what you want.'

## Storage

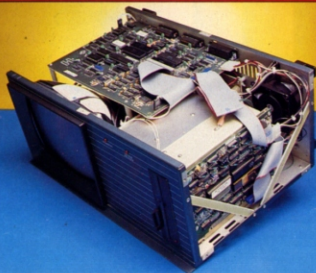
With a Z80A doing the pushing the 10 has 64K of RAM and just 4K of ROM.

Then there's the small matter of a 10Mb Winchester disk. Is this overkill? A sledgehammer to crack a nut? Perhaps there will prove to be an equivalent to Parkinson's Law that will say that data expands to fill the space available to it. 'Equivalent to 50 floppies!' Kaypro exclaims in its brochure, and that sounds like an awful lot of backing up. But the system keeps a sense of proportion by treating the hard disk as two drives, each divided into 16 user areas.

The 10 has a 5.25in floppy disk drive for back-up purposes. It takes single or double-sided, double-density disks, and Kaypro II users will be able to carry over data or programs to the larger system. There is a maximum of 390K on the floppy front.

The system generally is very responsive; saving and loading files are impressively fast operations. It may be that the most enduring reservation about the value of hard disks on portable machines will concern their resilience. But if you accept

In use the Kaypro 10's keyboard unclips from the front of the main unit, where the screen glowers beneath its hood. The exploded view (below, left) shows the guts of the system with the floppy and the hard disk drives side by side at the front. The keyboard unit (below, right) is easily stripped and crucial elements are accessible. The keys themselves are swept up in a banked effect.



that a 31lb machine is not likely to be going walkabout very often it could be a minor reservation.

### Expansion

Strictly speaking the Kaypro 10 has connections rather than expansion potential. The three ports at the back give it a Centronics interface, a serial printer interface, and one to attach a modem.

The modem port is intended to be used among other things with the Superterm software supplied by NLS. This was designed for the Kaypro line of machines and in one of its manifestations it can turn the 10 into a terminal tied into the Dow Jones system (or so we are assured).

### Software

It isn't necessary to say very much about MBasic, CBasic, SBasic, Old Uncle Tom Basic and all except that this surely is going

over the top. One programming language available in three versions (four if you count OBasic, and why not? The more the merrier?) It seems contradictory to say the least.

NLS, at great cost to its profit margins no doubt, is supplying a range of business applications to make life easy for the untutored business user, and it throws in several Basics which will never see the light of day if the Perfect range does the job.

Our system, as noted, was supplied with Wordstar and Microplan; this spreadsheet was so friendly that it was loath to let the reviewer go.

There's also a set of games in the package; these lack polish and demonstrate a juvenile sense of humour that American programmers would be well-advised to disguise. But the Kaypro 10 is a business system; perhaps the games were intended to be trivial.

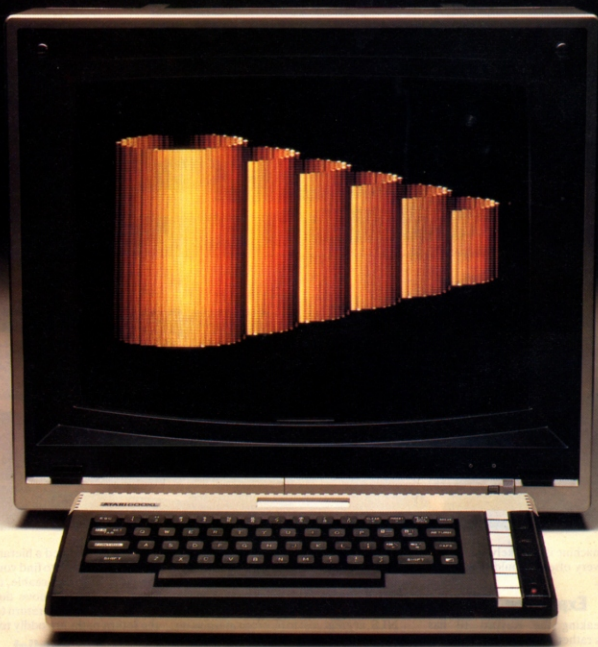
NLS has provided a hierarchy of menus and it isn't difficult to find your way around the system. It is noticeable, though, that it is much easier to move down from the master menu than to return to it as some of the return paths are oddly tortuous.

### Verdict

Who was it who said that of all human failings prophecy is the most gratuitous? If the Kaypro 10 succeeds, Adam Osborne may have to eat his words — but if his company collapses completely he may be glad of something to eat.

On the face of it the 10 certainly should succeed — at the price quoted NLS looks almost extravagantly generous. Most of the hardware elements are well tried and tested, and the same goes for the systems and applications software. CP/M and a Z80 may give it a dated air but most users are fairly pragmatic as 32-bit chips and Unix

# As your experience so can your



600XL Home Computer.

Whatever you want your home computer to do, the ATARI 600XL™ can do it.

**ATARI 600XL product specifications.**

**Colour capabilities:** 16 colours and 16 intensities. 256 shades.

**Memory:** 16K RAM expandable to 64K with memory expansion module. 24K ROM operating system including ATARI BASIC programming language.

**Sound:** 4 independent sound synthesisers. Each with a 3 1/2 octave range.

**Display:** 11 graphic modes. 5 text modes. Up to 320 x 192 resolution. Maximum text display 24 lines by 40 columns.

**Special ATARI integrated circuits:**

GTIA for graphics display. POKEY for sound and controller ports. ANTIC for screen control and I/O.

**CPU:** 6502C microprocessor. 0.56 micro-second cycle. 1.8 Mhz.

**Extended graphics functions:** High resolution graphics. Multi-coloured character set. Software screen switching. Multiple redefined character sets. Player missile (sprite) graphics. Fine screen scrolling. Changeable colour registers. Smooth character movement. Simple colour animation facilities.

**Programming features:** Built in ATARI

BASIC programming language plus 8 other languages. HELP key will provide additional information and menu screens. Syntax checking on entry.

**Input/Output:** External processor bus for expansion with memory and peripherals. 2 controller ports. Serial I/O connector. Monitor output.

**Software:** Over 1000 items of software available including self teaching programs with unique voice over. Education. Home management. Programming aids. Atari user written programs (APX). And Atari's famous entertainment software.

# Experience grows Atari 600XL.



1. Program Recorder.



2. 64K Memory Module.



3. Touch Tablet.



4. Trak Ball™ Controller.



5. Super Joysticks.



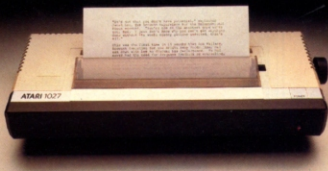
6. Colour Printer.



7. Disk Drive.



8. 80 Column Dot Matrix Printer.



9. Letter Quality Printer.

These peripherals will be available soon:  
1. ATARI 1010™ Program Recorder for low cost storage and retrieval capability. Data transmission 600 baud. Storage capability 100K bytes on a 60 minute cassette. Track configuration 4 track, 2 channels (digital and audio). Auto record/playback/pause control.

2. ATARI 64K Memory Module gives the 600XL a massive 64K RAM.

3. ATARI Touch Tablet enables you to paint pictures and draw diagrams, with the touch of a stylus.

4. ATARI Trak Ball™ Controller enables

cursor movement in any direction; adds to the pleasure of Atari games.

5. ATARI Super Joysticks. Gives you a greater competitive edge over your games.

6. ATARI 1020™ Colour Printer plotter. Four colour graphic print capability. #0 column. 10 characters per second. 5, 10 and 20 characters per inch.

7. ATARI 1050™ Dual Density Disk Drive. 5 1/4 inch disks holding 127K randomly accessible bytes provides both expansion and flexibility for your 600XL system with DOSIII.

8. ATARI 1025™ 80 Column Dot Matrix Printer prints 5, 10 or 16.5 characters per inch. 40 characters per second. Ideal for program listings, financial reports, etc.

9. ATARI 1027™ Letter Quality Printer for word processing letters in professional type.

If you'd like to know more about the ATARI 600XL, write to Atari International (UK) Inc., PO. Box 407, Blackhorse Road, London SE8 5JH and we'll send you all the details.

**The new Atari XL home computer system. ATARI®**

©ATARI and design. Reg. U.S. Pat and TM Off. TM. Trademark of Atari Inc. The ATARI 600XL is compatible with ATARI 400 and 800 programs.

19 sound good but what is needed is something that works — and works now.

Any reservations about the reliability of a portable system that includes a Winchester disk, which we've been warned for years are notoriously sensitive, should be considered in context. First, you probably won't be carrying the machine around very much. Second, LNS' power-down procedure includes a routine that tucks the disk up in bed as far as possible. Third, any disk drive can fail and at any moment, with or without being dropped from a great height.

Back-up will be a chore, granted. But to compensate for that there is the eye-opening and almost incredible luxury of having all the software, data files and programs alike, in one place. A Z80 driving a 10 megabyte hard disk may be like kick-starting a jumbo but it does leave you in control of a mobile jumbo.

Computer people are very fond of talking about what they call a learning curve. The Kaypro 10 will introduce you to a variation, the indolence curve. This is how it works: you start your microcomputing career with something that loads

software from a cassette — this is slow, tedious, and unreliable. Later, for an outlay of several hundred pounds, you graduate to a system with floppy disks — these are faster, more reliable, and for a time the last word in data storage. Eventually you may encounter a hard disk system and you'll feel almost self-

indulgent using it. It will rob you of all desire to shuffle floppies ever again.

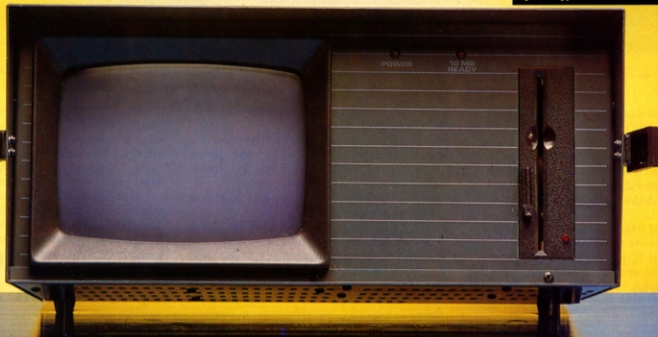
The next step may be foreshadowed in Shugart's announcement of a 1Gb optical disk (for \$7,000) two weeks ago. An outrageous prospect? The Kaypro 10 would have seemed so a couple of years ago.

**SPECIFICATION**

<b>Price</b>	£3,306 inc VAT
<b>Processor</b>	Zilog Z80A
<b>RAM memory</b>	64K
<b>ROM memory</b>	4K
<b>Text screen</b>	80x25
<b>Graphics screen</b>	160x100 pixels
<b>Keyboard</b>	76-key full-travel detachable, numeric keypad, 14 programmable
<b>Interfaces</b>	Two RS232, one Centronics
<b>Storage</b>	10Mb Winchester disk, 5.25in floppy up to 390K
<b>OS</b>	CP/M 2.2
<b>Languages</b>	MBasic, CBasic, SBasic, OBasic
<b>Software</b>	A choice of word processing, spreadsheet, spelling checker packages to be determined; Word Plus, Superterm; games
<b>Manufacturer</b>	Non-Linear Systems Inc, Solana Beach, California
<b>Distributor</b>	CK Computers, Plymouth (0752) 780311.



The top of the system packed for portability — around the handle are clustered ports, a vent and superfluous feet. Below, the stylish Kaypro 10 dashboard.





# YOUR LOCAL COMPUTER SHOP

## OFFERS 30 DAY MONEY-BACK GUARANTEE

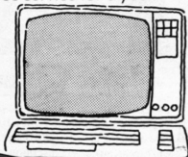


**W**hether you're shopping for a home computer or software for your existing machine Rumbelows are the only shop to let you try it at home and, if it's not exactly what you want, to return it for a full refund. Not only that but we offer free insurance and free service for a year.

**COMMODORE 64 Home Computer. 64K memory capacity. Built-in synthesizer and hi-fi output. 16 colours on screen. High resolution graphics.**

**PRICE WINNER £199.99**

Easy terms available.



**ORIC 1** - Home Computer 16K 57 typewriter like keys. RGB monitor socket.

**PRICE WINNER £139.99**

Easy terms available.



**WIDE RANGE OF SOFTWARE AVAILABLE IN STORE**

**COMMODORE VIC 20 Home Computer.** Easy to operate with a wide variety of programmes available. Simple connection to TV set via aerial socket.

**PRICE WINNER £139.99**

Easy terms available.



**FREE STARTER PACK WORTH OVER £70 IDEAL FOR BEGINNERS**

- Cassette Player
- Introduction to Basic part 1
- 4 game cassette

**SINCLAIR Spectrum 48K Ram Home Computer.** Life action keyboard with silent moving keys. Includes free demonstration cassette with 14 pre-recorded programmes.

**PRICE WINNER £129.99**

Easy terms available.

**ALSO AVAILABLE**

**SINCLAIR Spectrum 16K Ram. PRICE WINNER £99.99**

**TEXAS 16K Home Computer T1994A. PRICE WINNER £99.99**

**UP TO £750 INSTANT CREDIT**

SUBJECT TO STATUS. TYPICAL APR 41.2%. ASK FOR DETAILS.



**RUMBELOWS. BRITAIN'S BEST DEAL.**

LOW PRICES  
PLUS FREE DELIVERY  
FREE SERVICE FOR A YEAR  
FREE INSURANCE FOR A YEAR  
FREE REMOVAL OF OLD PRODUCT  
30 DAY MONEY-BACK GUARANTEE

**We save you money and serve you right.**

# AT LAST, A HOME COMPUTER THAT IMPROVES WITH AGE.



## It's surprising how many first-time relationships with a home computer go sour with age.

You buy an attractive, discounted little machine so that you and the children can learn about computers.

Instead, you learn about its limitations: the dull graphics. The plugs that fall out. The cheap power supply. The unalterable "beginners" language. The stiff, fragile keys. No provision for future developments. If only you'd looked around a bit in the beginning... "Quality costs a little more, but it's usually worth paying for" (Personal Computer News - CGL M5 Review, June '83.)

The CGL M5 is designed and built by Sorid, one of Japan's leading computer specialists, with three main ideas in mind.

First, to be easy and fun to learn and operate.

Second, to be rugged enough to last through hours and hours of operation.

And third, to form the basis of a powerful, versatile home computer system that won't need replacing until you're ready for a dedicated business system.

### Built to learn

The CGL M5 is designed to be easy for non-geniuses to use.

"On the M5, most of the work is done for you, and all that is left is the need to work out what to do next, rather than how to do it." (Personal Computer News, June '83.)

If you make a mistake, you can correct it with a simple movement of the cursor. So you only correct that mistake, not a whole line; nor do you have to indulge in complex edit commands.

Budding video game designers and computer artists will love to get their hands on the 16 colour graphics and 32 moveable images called "sprites."

*"The M5 makes professional graphic*

*effects very simple for even the beginner to achieve."* (Personal Computer World, Aug. '83.)

### Built to last

"It works first time, doesn't need a lot of mollycoddling and jiggery-pokery to persuade it to continue to do so, and what's even better, it continues to work well. You don't have to balance cold cartons of milk on the top, shove matches in the back to keep the plugs in, or press the keys with several pounds force to make them respond." (Personal Computer News, June '83.)

Being able to build things that work and carry on working without endless maintenance is something at which the Japanese seem to excel.

### Built to grow

To be truly versatile, a home computer has to understand very different things.

So you need different "languages," which the M5 provides by supplying part of its memory in plug-in cartridges.

"The M5 eliminates the worst limitations on machines at this level, which is that they tend to be stuck with whatever language is provided by the management." (Personal Computer News, June '83.)

The computer is supplied complete with a Basic-I cartridge, a standard integer BASIC language and a simple learning text.

Plug in the Basic-G cartridge, and you can access the M5's incredibly sophisticated graphic and sound capabilities which are far in advance of similarly-priced computers.

Move on to the Basic-F cartridge, and you have scientific, technological and statistical computing power usually available only

on big computers with equally big price tags.

The FALC cartridge provides a tailor-made language for data management, spreadsheet accounts and business problems. Combine FALC with a disc and you could "turn the M5 into a small business machine." (Personal Computer Magazine, August '83.)

Now, take a look at the back of the M5.



Notice the sockets (usually an extra) for a standard

Centronics-type printer, the separate video monitor and hi-fi sound output.

Even the language cartridge socket has hidden potential.

"Unlike most such sockets, this one has 56 internal lines connected to it giving access to just about every function in the computer. This means that just about everything you can think of can be added onto the computer, ranging from a Prestel interface to second processor to use as an intelligent terminal on a timesharing computer..." (Electronics - The Maplin Magazine, March '83.)

Take a look at the home computer that will improve with age.

For a full technical specification of the CGL M5, details of the wide range of supporting software and to find out where to see a complete demonstration, send the coupon to:

CGL, CGL House, Goldings Hill, Loughton, Essex IG10 2RR. Telephone number: 01-508 5600.

I'd like to know more about the CGL M5. Please send me a brochure and a list of dealers. PCN 2

Name \_\_\_\_\_

Address \_\_\_\_\_

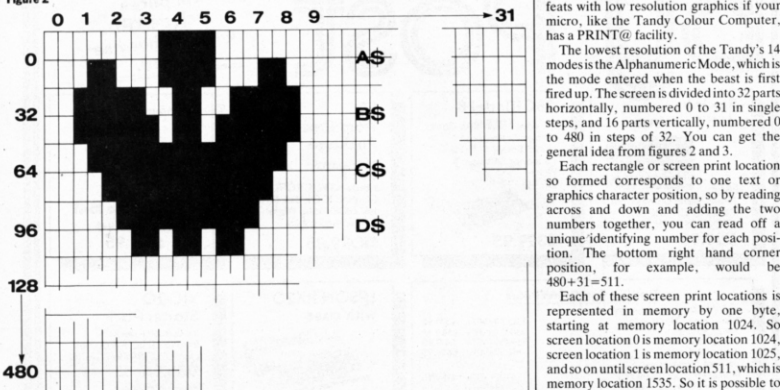
**CGL M5**  
HOME COMPUTER

BUILT TO LEARN. BUILT TO LAST. BUILT TO GROW.

PRINT@ gives Harold Gibson high expectations of low resolution graphics

# The graphic arts

Figure 2



High resolution can make a machine seem a really attractive buy, and many of the newer machines on the market really shine in this area. But you can still perform some fairly spectacular feats with low resolution graphics if your micro, like the Tandy Colour Computer, has a PRINT@ facility.

The lowest resolution of the Tandy's 14 modes is the Alphanumeric Mode, which is the mode entered when the beast is first fired up. The screen is divided into 32 parts horizontally, numbered 0 to 31 in single steps, and 16 parts vertically, numbered 0 to 480 in steps of 32. You can get the general idea from figures 2 and 3.

Each rectangle or screen print location so formed corresponds to one text or graphics character position, so by reading across and down and adding the two numbers together, you can read off a unique identifying number for each position. The bottom right hand corner position, for example, would be 480+31=511.

Each of these screen print locations is represented in memory by one byte, starting at memory location 1024. So screen location 1 is memory location 1024, screen location 1 is memory location 1025, and so on until screen location 511, which is memory location 1535. So it is possible to

Figure 1

```

70 CLS(5)
80 GOSUB 10000
90 CLS(0)
100 *$ENGLE STRINGS$$
105 R1=CHR$(143+48)+CHR$(143+48)
110 R2=CHR$(129+48)+CHR$(130+48)+CHR$(128)+CHR$(143+48)+CHR$(143+48)+CHR$(128)+C
HR$(129+48)+CHR$(130+48)
120 B=R1+CHR$(139+48)+CHR$(133+48)+CHR$(138+48)+CHR$(135+48)+R1$
130 C=R1+CHR$(132+48)+R1$+R1$+R1$+CHR$(136+48)
140 D=CHR$(126)+CHR$(132+48)+CHR$(143+48)+CHR$(141+48)+CHR$(142+48)+CHR$(143+48)
+CHR$(136+48)+CHR$(128)
150 P1=CHR$(128)+CHR$(128)+CHR$(128)
155 P2=P1+CHR$(131+48)+CHR$(131+48)+P1$
160 Q=CHR$(135+48)+CHR$(139+48)+CHR$(139+48)+CHR$(130+48)+CHR$(141+48)+CHR$(142+48)+CHR$(129
+48)+CHR$(135+48)+CHR$(139+48)
170 R=CHR$(141+48)+R1$+CHR$(135+48)+CHR$(139+48)+R1$+CHR$(142+48)
180 S=CHR$(128)+CHR$(141+48)+R1$+R1$+CHR$(142+48)+CHR$(128)
190 T=CHR$(128)+CHR$(128)+CHR$(140+48)+CHR$(140+48)+CHR$(132+48)+CHR$(136+48)+CHR$(140+48)+C
HR$(128)+CHR$(128)
200 *$CASTLE STRINGS$$
210 G1=CHR$(143+32)+CHR$(143+32)
220 G2=CHR$(131+32)+CHR$(129+32)+CHR$(130+32)+CHR$(129+32)+CHR$(130+32)+CHR$(129
+32)+CHR$(130+32)+CHR$(131+32)
230 H=CHR$(141+32)+CHR$(143+32)+CHR$(141+32)+CHR$(142+32)+CHR$(141+32)+CHR$(142
+32)+CHR$(143+32)+CHR$(142+32)
240 I=CHR$(143+32)+CHR$(143+32)+CHR$(135+32)+CHR$(139+32)+CHR$(135+32)+CHR$(139+32)
+CHR$(143+32)+CHR$(128)
250 J=CHR$(128)+G1+G1+G1$
255 K=CHR$(140+32)+CHR$(140+32)
260 K$=CHR$(128)+K1+K1+K1$
270 L=CHR$(143+32)+CHR$(135+32)+CHR$(139+32)+CHR$(135+32)+CHR$(139+32)+CHR$(135
+32)+CHR$(139+32)+CHR$(143+32)
280 M=CHR$(132+32)+CHR$(143+32)+CHR$(133+32)+CHR$(138+32)+CHR$(133+32)+CHR$(138+32)+CHR$(133+32)+CHR$(138
+32)+CHR$(143+32)+CHR$(136+32)
290 N=CHR$(128)+G1+G1+G1$
510 CLS(0)
320 FOR I=0 TO 31 SET J, I, 1) : NEXT
330 FOR I=0 TO 63 SET J, 9, 1) : NEXT
540 FOR I=0 TO 31 SET J, 42, I, 1) : NEXT
550 FOR J=0 TO 63 SET J, 21, 1) : NEXT
560 PRINT(80,"1")
570 PRINT(81,"2")
580 PRINT(83,"3")
590 PRINT(85,"4")
600 PRINT(87,"5")
610 PRINT(89,"6")
620 PRINT(91,"7")
630 PRINT(93,"8")
640 PRINT(95,"9")
650 P1=PEEK(1024+63)-143
655 P2=PEEK(1024+75)-143
660 P3=PEEK(1024+90)-143
665 P4=PEEK(1024+260)-143
670 P5=PEEK(1024+271)-143
675 P6=PEEK(1024+382)-143
680 P7=PEEK(1024+452)-143
685 P8=PEEK(1024+463)-143
690 P9=PEEK(1024+474)-143
700 I$="32R9CF#32R9CF#32THEGOSUB$B$B$B$
705 I$F4#32R9CF#32R9CF#32THEGOSUB$B$B$B$
710 I$F7#32R9CF#32R9CF#32THEGOSUB$B$B$B$
715 I$F1#32R9CF#32R9CF#32THEGOSUB$B$B$B$
720 I$F2#32R9CF#32R9CF#32THEGOSUB$B$B$B$
725 I$F3#32R9CF#32R9CF#32THEGOSUB$B$B$B$
730 I$F5#32R9CF#32R9CF#32THEGOSUB$B$B$B$
735 I$F6#32R9CF#32R9CF#32THEGOSUB$B$B$B$
740 I$F1#48R9CF#48R9CF#48THEGOSUB$B$B$B$
750 I$F4#48R9CF#48R9CF#48THEGOSUB$B$B$B$
760 I$F7#48R9CF#48R9CF#48THEGOSUB$B$B$B$
765 I$F1#48R9CF#48R9CF#48THEGOSUB$B$B$B$
770 I$F2#48R9CF#48R9CF#48THEGOSUB$B$B$B$
775 I$F3#48R9CF#48R9CF#48THEGOSUB$B$B$B$
780 I$F1#48R9CF#48R9CF#48THEGOSUB$B$B$B$
785 I$F2#48R9CF#48R9CF#48THEGOSUB$B$B$B$
790 R$="1$E" I$F$="THEGOSUB$B$B$B$
800 B$="1$E I$ I$F$="THEGOSUB$B$B$B$
810 I$R$=CHR$(69)+CHR$(69)+CHR$(49)+THEGOSUB$4100(G)0T0$50
820 I$R$=CHR$(69)+CHR$(69)+CHR$(50)+THEGOSUB$4200(G)0T0$50
830 I$R$=CHR$(69)+CHR$(69)+CHR$(51)+THEGOSUB$4300(G)0T0$50
840 I$R$=CHR$(69)+CHR$(69)+CHR$(52)+THEGOSUB$4400(G)0T0$50
850 I$R$=CHR$(69)+CHR$(69)+CHR$(53)+THEGOSUB$4500(G)0T0$50
860 I$R$=CHR$(69)+CHR$(69)+CHR$(54)+THEGOSUB$4600(G)0T0$50
870 I$R$=CHR$(69)+CHR$(69)+CHR$(55)+THEGOSUB$4700(G)0T0$50
880 I$R$=CHR$(69)+CHR$(69)+CHR$(56)+THEGOSUB$4800(G)0T0$50
890 I$R$=CHR$(69)+CHR$(69)+CHR$(57)+THEGOSUB$4900(G)0T0$50
900 I$R$=CHR$(69)+CHR$(69)+CHR$(58)+THEGOSUB$5000(G)0T0$50
910 I$R$=CHR$(69)+CHR$(69)+CHR$(59)+THEGOSUB$5100(G)0T0$50
920 I$R$=CHR$(69)+CHR$(69)+CHR$(60)+THEGOSUB$5200(G)0T0$50
930 I$R$=CHR$(69)+CHR$(69)+CHR$(61)+THEGOSUB$5300(G)0T0$50
940 I$R$=CHR$(69)+CHR$(69)+CHR$(62)+THEGOSUB$5400(G)0T0$50
950 I$R$=CHR$(69)+CHR$(69)+CHR$(63)+THEGOSUB$5500(G)0T0$50
960 I$R$=CHR$(69)+CHR$(69)+CHR$(64)+THEGOSUB$5600(G)0T0$50
970 I$R$=CHR$(69)+CHR$(69)+CHR$(65)+THEGOSUB$5700(G)0T0$50
980 I$R$=CHR$(69)+CHR$(69)+CHR$(66)+THEGOSUB$5800(G)0T0$50
990 I$R$=CHR$(69)+CHR$(69)+CHR$(67)+THEGOSUB$5900(G)0T0$50
3270 I$R$=CHR$(12)+THEGOSUB$
3980 I$R$="C" OR$R$="E" THEN$50
4100 *$PRINT ENGLE RT 1$
4110 PRINT(81,"R")
4120 PRINT(83,"B")
4130 PRINT(85,"C")
4140 PRINT(87,"D")
4150 GOSUB(80) RETURN
4200 *$PRINT ENGLE RT 2$
4210 PRINT(81,"R")
4220 PRINT(84,"B")
4230 PRINT(87,"C")
4240 PRINT(89,"D")
4250 GOSUB(80) RETURN
4300 *$PRINT ENGLE RT 3$
4310 PRINT(83,"B")
4320 PRINT(85,"C")
4330 PRINT(87,"C")
4350 PRINT(89,"C")

```

Continued p.27

# Computers by Post

All prices include VAT unless otherwise stated.

## Sinclair 48K Spectrum

FREE

2 Best-selling Games from  
ITMAGINE, ZIP-ZAP AND  
ZOOM! WORTH £11

£129.95



## BBC Model B

Includes FREE Killer Gorilla  
(Program Power)  
Hunch Back  
(Superior Software)  
Worth  
£15.90

£399.95



## BBC Word Processing Package

BBC Model B  
Disk 1 F  
Wordwise W P ROM  
Cumana 100K Disk Drive  
Juki 6100 Daisy Wheel  
Printer + call cables

£1099.95

## Commodore 64

£189.95



Commodore 1541  
Disk Drive  
£189.95

## The UK's Best Printer Prices

### DRISYWHEEL LETTER QUALITY

Smith Corona TPI (P or S)  
Juki 6100 (P)  
Brother HR1 (P or S)  
Brother HR1S (P)

330.39+VAT = £379.95  
339.09+VAT = £389.95  
530.09+VAT = £619.95  
382.57+VAT = £439.95

### PRINTER TYPEWRITERS

Brother EP22 Dot Matrix (S)  
Remstar 201 Daisy Wheel (P)  
Silver Reed EX44 Daisy Wheel (S)

139.09+VAT = £159.95  
347.78+VAT = £399.95  
399.96+VAT = £459.95

### DOT MATRIX PRINTERS

EPSON RX80 (P)  
EPSON RX80 F T (P)  
EPSON FX80 (P)  
EPSON FX80 F T (P)  
EPSON FX800 F T (P)  
Seiksha GPOOR (P)  
Seiksha GPOORS (S)  
Seiksha GPOORC (CBM)  
Seiksha GP250X (P + S)  
Seiksha Friction Feed Adaptor  
Seiksha GP700R colour (P)  
Star DP850 + 2K Buffer (P)  
Star DP85 + 2K Buffer (P)  
Shinwa C180 (P)

243.40+VAT = £279.95  
269.50+VAT = £309.95  
365.17+VAT = £419.95  
399.96+VAT = £459.95  
469.52+VAT = £539.95  
173.87+VAT = £199.95  
182.57+VAT = £209.95  
182.57+VAT = £209.95  
217.35+VAT = £249.95  
26.04+VAT = £29.95  
356.48+VAT = £409.95  
234.74+VAT = £269.95  
304.30+VAT = £349.95  
243.44+VAT = £279.95

We supply a wide range of Cables and Interfaces Phone for Details.

(P)=Parallel-Centronics  
(S)=Serial RS232

## EPSON HX20 with case



FREE  
Micro Cassette Drive  
(Usual Price £80)  
£399 + VAT  
= £458.85

## VIC-20 Starter Pack

Inc Cassette Deck  
Intro to BASIC + 4 Games  
plus 10 EXTRA FREE GAMES  
£135.95

VIC-20 21K  
Starter Pack  
plus  
FREE DATABASE PROGRAM  
£165.95

### Commodore

VIC 16K RAM inc Database  
Cassette Program £29.95  
16K, 3K Switchable RAM Pack £34.95

VIC-20 5K £98.95  
VIC Package see box above  
C2N Cassette £39.95

### Commodore 64

1541 Disk Drive £219.95  
1525 Tractor Printer £215.95  
1526 Friction tractor Printer £319.95  
1520 Colour Printer Plotter £149.95  
1701 Colour Monitor £219.95  
Simons Basic ROM £44.95  
Easyscript W P Disk £69.95  
Petspeed Compiler Disk £44.95

Rtali  
400 16K inc BASIC £97.95  
800 48K inc BASIC £269.95  
600XL 16K £149.95  
Other New Models phone for prices

Dragon  
New Dragon 64 £219.95  
Dragon 32 £159.95  
Disk Drive inc Controller £259.95

### BBC

Model B See Box Above  
Disk Interface Kit £81.95  
Model B inc Disk 1 F £459.95

Cumana 1x100K Disk Drive £204.95  
Cumana 1x200K Disk Drive £259.95  
Cumana 2x100K Disk Drive £385.95

Cumana 2x200K Disk Drive £495.95  
Cumana 2x400K Disk Drive £649.95

Disk Drive Cable, Manual + form, disk extra £25.00  
Microvite 14" RGB Monitor £235.95  
Wordwise W P ROM £39.95  
Beeb-calc W P ROM £35.95  
Ricon Electron Phone £19.95

Sinclair  
Spectrum 16K £94.95  
Spectrum 48K see box above

ZX Printer £37.95  
Kempston Printer 1 F £39.95  
Kempston Joystick 1 F £17.95  
16K-48K Upgrade £22.95

ORIC  
48K £129.95  
4 programs game pack £6.95  
Colour Printer Plotter £129.95

## Low Prices on Monitors

### Monochrome

Sanjyo 12" med-res green 15 MHz  
Sanjyo 12" hi-res green 18 MHz  
Phoenix 12" V. hi-res green 24 MHz  
Phoenix 12" V. hi-res amber 24 MHz

67.78+VAT = £77.95  
86.91+VAT = £99.95  
92.13+VAT = £105.95  
95.60+VAT = £109.95

### Colour

Microvite 14" std-res RGB  
Microvite 14" std-res RGB composite  
Microvite 16" med-res RGB  
Microvite 20" std-res RGB  
Sanjyo 14" med-res RGB  
Commodore 14" 1701 Composite  
Sony Prafeel 20" RGB composite  
Sony Prafeel 27" RGB composite

205.17+VAT = £235.95  
234.74+VAT = £269.95  
304.30+VAT = £349.95  
286.91+VAT = £329.95  
208.65+VAT = £239.95  
191.26+VAT = £219.95  
405.17+VAT = £465.95  
573.87+VAT = £659.95



Delivery by Securicar-FREE Delivery and Packing.  
Send off the coupon or order by phone quoting your  
Access Barclaycard No. Phone 01-681 8785. Immediate  
despatch on receipt of order or cheque clearance.

**GALASET LTD** 30 Bayford Rd, Littlehampton,  
West Sussex. Tel: 01-681 8785

These prices correct until superseded by next advertisement.

All the goods in this advertisement are available for EXPORT.

To: Galaset Ltd., 30 Bayford Road,  
Littlehampton, West Sussex.

Please supply:

I enclose my cheque for £  
(FREE delivery and packing)  
or charge my Access Barclaycard No.

Name \_\_\_\_\_ Signature \_\_\_\_\_  
Address \_\_\_\_\_

PCN 3 T1

POKE data to a memory location for all character positions.

But the Tandy also has PRINT@, a very powerful tool which, together with CHR\$, can make colourful, if somewhat chunky, graphics really easy. PRINT@ places a graphics or text character on screen in any one of 512 positions.

Figure 4 shows the 16 graphics characters used with the CHR\$ function, along with their associated ASCII codes. Each can be altered from its original green and black to any one of the other seven colours available.

Resolution is not as coarse as you might think, although each character can only be black and one other colour at any given time. The character position is really divided into four elements (the 64\*32 Semigraphics 4 Mode), as can be seen from figure 4, and if the characters are printed on a black background, then the black portions simply merge. You can, of course, CLS the screen to any colour and get the coloured elements to merge, leaving your martian in sparkling galaxian black!

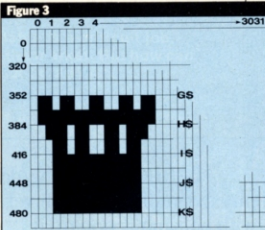
The syntax for PRINT@ and the CHR\$ function works like this: PRINT@ X, CHR\$ (ASCII CODE + COLOR N); where X is the screen location and the colour number is 16-yellow, 32-blue, 48-red, 64-buff, 80-cyan, 96-magenta and 112-orange.

The colour number can be added to the ASCII code beforehand if you are struggling for memory, but personally I cannot see the fun in adding numbers together while sitting in front of a machine designed to do just that. It is also much easier to recognise just which character is being PRINTed and in what colour if the PROGRAM is listed in the above format. Anyway, an extra 1.5K can always be had in this MODE by typing in the PCLEAR 3 command.

PRINT@ can also be used with text strings. Here the syntax is: PRINT@ X, "TEXT"; The string is then PRINTed with the first character, in this case 'T' at the screen location specified by X.

CHR\$ is a string function, so several graphics characters can be added together to form a composite graphics image, as shown in the examples in figures 2 and 3. A good approach is to store them in a string variable, as in:

XS=CHR\$(129+32)+CHR\$(130+32)  
Once you've typed in the Supercross game, presented here in figures 1, compare it with the sketches in figures 2 and 3, and you'll see that the above technique is used, and 3 is stored in the variable shown on the right of the sketch, and called up for PRINTing with PRINT@ when required.



Program lines 100 to 270 show this string building procedure.

In this instance the method used to show all required strings on screen at the same time is to use one PRINT@ statement for each string variable, and to locate each set of statements in its own subroutine. Program lines 4100 to 4150 and 5700 to 5760 illustrate this point. The subroutine is called in this case by the use of the INKEY\$ function, so that by a single keystroke the complete graphics figure can be sited anywhere on screen instantaneously. There is positively no waiting with PRINT@.

Figure 3 shows how the Tandy's screen is divided in the alphanumeric mode, while figure 4 gives the ASCII codes of the micro's graphics characters.

```

4340 PRINT@119,DE;
4350 GOSUB6000 RETURN
4400 **PRINT EGGLE AT 4XX
4410 PRINT@161,PE;
4420 PRINT@193,OE;
4430 PRINT@225,FE;
4440 PRINT@257,SE;
4450 PRINT@289,TE;
4460 GOSUB6000 RETURN
4500 **PRINT EGGLE AT 5XX
4510 PRINT@172,PE;
4520 PRINT@204,OE;
4530 PRINT@236,FE;
4540 PRINT@268,SE;
4550 PRINT@300,TE;
4560 GOSUB6000 RETURN
4600 **PRINT EGGLE AT 6XX
4610 PRINT@183,PE;
4620 PRINT@215,OE;
4630 PRINT@247,FE;
4640 PRINT@279,SE;
4650 PRINT@311,TE;
4660 GOSUB6000 RETURN
4700 **PRINT EGGLE AT 7XX
4710 PRINT@235,PE;
4720 PRINT@267,OE;
4730 PRINT@299,FE;
4740 PRINT@331,SE;
4750 PRINT@363,TE;
4760 GOSUB6000 RETURN
4800 **PRINT EGGLE AT 8XX
4810 PRINT@264,PE;
4820 PRINT@296,OE;
4830 PRINT@328,FE;
4840 PRINT@360,SE;
4850 PRINT@392,TE;
4860 GOSUB6000 RETURN
4900 **PRINT EGGLE AT 9XX
4910 PRINT@275,PE;
4920 PRINT@307,OE;
4930 PRINT@339,FE;
4940 PRINT@371,SE;
4950 PRINT@403,TE;
4960 GOSUB6000 RETURN
5100 **PRINT CASTLE AT 1XX
5110 PRINT@1,LE;
5120 PRINT@33,HE;
5130 PRINT@65,HE;
5140 PRINT@97,HE;
5150 GOSUB7000 RETURN
5200 **PRINT CASTLE AT 2XX
5210 PRINT@12,LE;
5220 PRINT@44,HE;
5230 PRINT@76,HE;
5240 PRINT@108,HE;
5250 GOSUB7000 RETURN
5300 **PRINT CASTLE AT 3XX
5310 PRINT@23,LE;

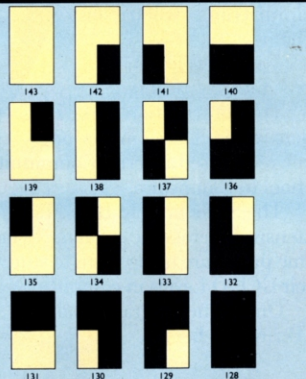
```

```

5320 PRINT@55,HE;
5330 PRINT@87,HE;
5340 PRINT@119,HE;
5350 GOSUB7000 RETURN
5400 **PRINT CASTLE AT 4XX
5410 PRINT@161,LE;
5420 PRINT@193,HE;
5430 PRINT@225,IE;
5440 PRINT@257,JE;
5450 PRINT@289,KE;
5460 GOSUB7000 RETURN
5500 **PRINT CASTLE AT 5XX
5510 PRINT@172,LE;
5520 PRINT@204,HE;
5530 PRINT@236,IE;
5540 PRINT@268,JE;
5550 PRINT@300,KE;
5560 GOSUB7000 RETURN
5600 **PRINT CASTLE AT 6XX
5610 PRINT@183,LE;
5620 PRINT@215,HE;
5630 PRINT@247,IE;
5640 PRINT@279,JE;
5650 PRINT@311,KE;
5660 GOSUB7000 RETURN
5700 **PRINT CASTLE AT 7XX
5710 PRINT@235,LE;
5720 PRINT@267,HE;
5730 PRINT@299,IE;
5740 PRINT@331,JE;
5750 PRINT@363,KE;
5760 GOSUB7000 RETURN
5800 **PRINT CASTLE AT 8XX
5810 PRINT@264,LE;
5820 PRINT@296,HE;
5830 PRINT@328,IE;
5840 PRINT@360,JE;
5850 PRINT@392,KE;
5860 GOSUB7000 RETURN
5900 **PRINT CASTLE AT 9XX
5910 PRINT@275,LE;
5920 PRINT@307,HE;
5930 PRINT@339,IE;
5940 PRINT@371,JE;
5950 PRINT@403,KE;
5960 GOSUB7000 RETURN
6000 SOUND210:1:SOUND200:1:SOUND190:1:SOUND210:1:SOUND200:4:SOUND200:4:RETURN
7000 SOUND150:1:SOUND140:1:SOUND130:1:SOUND150:1:SOUND140:4:SOUND140:4:RETURN
8000 SOUND230:3:SOUND230:3:SOUND230:2:RETURN
10000 **PRINT INSTRUCTIONS**

```

Figure 4



```

10010 PRINT@9,"SUPERCROSS III";
10020 PRINT@66,"THIS GAME IS FOR TWO PLAYERS";
10030 PRINT@97,"EACH PLAYER HAS A SYMBOL - THE";
10040 PRINT@129,"EGGLE OR THE CASTLE - AND TAKE";
10050 PRINT@161,"TURNS TO PLACE THEIR SYMBOL ON";
10060 PRINT@193,"SCREEN IN THEIR CHOSEN SQUARE";
10070 PRINT@235,"PRESS";
10080 PRINT@267,"(E) FOR EGGLE (C) FOR CASTLE";
10090 PRINT@299,"FOLLOWED BY THE SQUARE NUMBER";
10100 PRINT@331,"PRESS(CLEAR)";
10110 PRINT@363,"THICE";
10120 PRINT@395,"TO START A NEW GAME";
10130 PRINT@427,"IF THE WRONG LETTER KEY IS";
10140 PRINT@459,"PRESSED SIMPLY PRESS THE CORRECT";
10150 PRINT@491,"KEY THICE";
10160 PORT=1030000:NEXT RETURN

```

# Not all home computers stay at home.

The BBC Micro is the ideal family computer—simple to operate, yet fast, powerful, with enormous potential.

But it's nice to know, when you buy one for your home, that the business, educational and scientific worlds agree with your choice.

Here are a few stories to illustrate how the BBC Micro gets out and about. And one to remind you how helpful it can be when it stays at home.

## A practical lesson in business admin.

The contribution of the BBC Micro in the classroom has long been recognised at Perins Community School in Hampshire.

The School has 12 BBC Micros used extensively across the syllabus: in fact some pupils are using them to study for their GCE O Levels in computing.

One of the programs available to Perins teachers

such as David Beck, pictured below with his class, is "Newsagent."

This program contains all the necessary information for the class to run a newsagent's shop; allowing them to organise daily deliveries, make up bills and keep an eye on stock control and ordering.

It's a nice example of how the BBC Micro can be used not only to acquaint a class with the language of computers, but also with some of the realities of the community in which they live.

## Correcting Jodrell Bank.

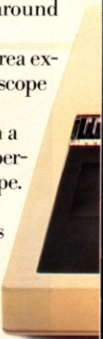
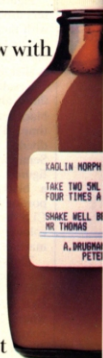
The BBC Micro is a familiar worker around Jodrell Bank.

You'll find it in the reception area explaining the workings of a radio telescope to visitors, for example.

But it's also been helping in a more testing task: to improve the performance of the Defford telescope.

In this application it has been used to make calculations necessary to determine the precise parabolic shape of the dish.

Theodolites are used to do the measuring—then the BBC Micro works out the necessary corrections.



### The end of the scrawl.

If any of you have noticed how much easier it is to read and understand labels on drugs and medicines these days, then you can most probably thank the BBC Micro. John Richardson, a Preston pharmacist, was first to realise how a micro with a suitable printer could produce labels that were accurate and legible and which could include, automatically, such information as drug reaction warnings.

At the same time it could record drug usage for better stock control.

He chose the BBC Micro for its versatility and potential for expansion.

John Richardson believes that this system will be recognised as standard in the profession and be used in hospitals, health centres and pharmacies throughout the UK.

### Meanwhile back at home.

Dr. & Mrs. Yarwood bought a BBC Micro as a birthday present for their 12 year old daughter.

programs. Mrs. Yarwood is particularly proud of one program she has compiled to help teach her daughter French vocabulary.

They all agree that although the Micro is fast and powerful enough to be at home in Jodrell Bank, it is also the ideal computer at the Yarwood home: simple to set up (virtually any TV set and cassette player is all you need) and simple to use.



### All this for only £399.

The BBC Micro comes with a comprehensive, step-by-step User Guide which introduces you to your micro and shows you how to construct useful programs of your own.

You will also receive a free "Welcome" cassette which contains 15 different programs for you to experiment with, ranging from music and graphics to games like Kingdom and Bat n' Ball.

The BBC Micro is available from WH Smith Computer Shops, Boots, John Lewis and local Acorn stockists.

Alternatively if you would like to order one with your credit card or if you want the address of your nearest supplier just phone 01-200 0200 or 0933-79300.



However, it quite quickly became common property. All three can now write their own

## **The BBC Microcomputer System.**

Designed, produced and distributed by Acorn Computers Limited.

Paul Giblett explains the uses of the Machine Operating System in your own programs.

# Beeb special FX

One of the BBC's biggest advantages is that it has a complete Machine Operating System (MOS) separate from its Basic. This provides facilities for other programs and languages, but the MOS can also be accessed directly by prefixing commands with an asterisk.

Over the next two issues *PCN* will be providing a guide to some of the more useful of these commands.

In BBC Basic an asterisk indicates that the line which follows is intended for processing by the MOS, not the language interpreter. The language accepts the 'commandline' and removes the asterisk as well as any leading spaces before storing the line in the language workspace (&700-&7FF).



The language then passes control to the Command Line Interpreter (CLI), and the Y register of the processor containing an offset which, when combined with a pointer at &F2, gives the address of the first character in the line to be processed.

The CLI offers the command line first to the MOS for processing. At issue 1.20 the MOS will recognise, though not necessarily act upon, the following commands:

```
*CAT      *EXEC *LOAD *RUN
*CODE    *FX  *MOTOR *SAVE
*DISC    *KEY *OPT  *TAPE
*DISK    *LINE *ROM  *TV
```

The special command \*HELP is also recognised.

If the MOS does not recognise the command line it is offered to each of the Service ROMs in turn, starting with the highest priority ROM. If this process also fails to produce a recognition of the line, it is finally offered to the current filing system.

If the Cassette Filing System (CFS) is active it will automatically generate the

'Bad command' error message and return control to the language. If, however, the Disk Filing System (DFS) is active an additional avenue for recognising the command is explored.

The DFS will search the current disk for a machine code file whose name matches the command line, one example of this being the \*FORMAT command in Acorn's DFS. If the DFS fails to find a suitable file the 'Bad command' error is generated. Thus it is relatively easy to add commands to the BBC's repertoire by placing them on disk or into a Sideways ROM.

Of the commands which are already implemented, by far the most versatile are the \*FX commands. These provide access to the MOS's OSBYTE routine. OSBYTE is a very powerful facility and is accessible fully only from machine code. It is capable of providing information on the machine's current status, and of altering that status. From machine code OSBYTE is accessed by placing the call number into the processor's accumulator, any necessary parameters into the X and Y registers and then jumping to OSBYTE's entry address at &FFFF.

OSBYTE calls may be used to send or to receive information, and in the latter case the information is returned in the X and Y registers. For example:

#### Send Call

##### Assembler Mnemonic

LDA#138	Places the character whose
LDX#0	ASCII code is 65 into
LDY#65	buffer 0 (the keyboard
JSR&FFFF4	buffer)
RTS	

#### Receive Call

##### Assembler Mnemonic

LDA#131	Returns the value of
JSR&FFFF4	OSHW — this is the top
STX&70	of the operating system
STY&71	RAM and is used to set
RTS	PAGE.

The first of the above examples is far more simply achieved by the command \*FX138,0,65. FX is an abbreviation of 'effects', and this group of commands can be used to achieve some very useful effects from a high level language, such as Basic. However, we are not able to get at the returned values of the OSBYTE calls that the \*FX commands call.

Thus \*FX commands will not return a value, with \*FXO being an exception to this. For example, try \*FX131 to achieve the second of the above examples. So it tends to be pointless to list receive FX commands without noting that you will need to use the equivalent OSBYTE call from machine code or write further Basic

around the FX command. Yet despite the limitations of being send only calls, the \*FX commands still provide an easy way to control many of the BBC's most powerful features.

Below is the first part of a list of send only \*FX commands I have compiled. The list will be completed next week. I would welcome ideas from anyone who has any details to add to the list, which seems to grow daily.

The command format is \*FXx,n,y, where x is the call number, and n and y are parameters.

\*FXO Prints the operating system version number eg 'OS 1.20'.

2,n Selects input stream for future input, n = 0-keyboard, 1-RS423, 2-keyboard with RS423 enabled.

3,n Selects output stream for future output. The user guide explanation of this facility is very simplified and the call is most easily explained at the bit level. There are four control bits:

Bit	Effect when set	Effect when not set
0	RS423 enabled	RS423 disabled
1	Screen disabled	Screen enabled
2	Printer disabled	Printer enabled
3	Force Printer*	

\*Printer is activated, as long as bit 2 is set, even without VDU2. This provides the facility to have the output go to printer with the screen disabled (since this would otherwise stop VDU2 from being sent).

4,n Controls the action of the cursor control keys, with the order of the keys being COPY, ←, →, ↓, ↑, n = 0-normal cursor action, 1-produces ASCII codes 135-139, 2-acts as function keys 11-15.

5,n Selects printer driver, n = 0=sets a printer sink, 1-selects Centronics printer driver, 2-selects RS423 driver, 3-selects user supplied printer driver. Address of routine must be placed at &222.

6,n Sets printer ignore character to n. This







call is usually used to suppress the line feeds which the BBC sends automatically after a carriage return, as many printers do the same. Thus \*FX16.10 avoids double line spacing on such printers (since 10 is the ASCII code for line feed).

**7,n** Selects RS423 receive rate in Baud (bits per second).

**8,n** Selects RS423 transmit rate in Baud, for both these calls, n = 0-Disabled, 1-75, 2-150, 3-300, 4-1200, 5-2400, 6-4800, 7-9600, 8-19200.

**9,n** and **10,n** These two calls are used to control the flash duration for flashing colours. \*FX9 sets the flash duration for the named colour, while \*FX10 sets the duration for its complement, with n being set in 1/50ths seconds. If either duration is set to zero the complement colour will be permanently displayed.

**11,n** Sets the delay before a depressed key is auto-repeated, within being set in 1/100ths seconds. If n = 0 auto-repeat is disabled.

**12,n** Sets the repeat period for auto-repeat, with n being set in 1/100ths seconds. If n = 0 the auto-repeat delay and period are reset to their default values.

**13,n** and **14,n** The BBC's MOS is described as interrupt driven. Put simply, it continually interrupts its current operation in response to one of a number of 'Events'. It will then deal with the event before proceeding with its current operation. These two calls allow the user to alter the MOS's response by enabling or disabling selected events. \*FX13,n disables event n, \*FX14,n enables event n, n = 0= output buffer empty, 1= input buffer full, 2= code entering input buffer, 3= ADC cycle complete, 4= start of vertical sync pulse, 5= interval timer at zero, 6= escape key pressed, 7= RS423 receive error, 8= service/network error.

**15,n** Flushes (that is, empties) buffers, n = 0=all buffers, 1=current output buffer.

**16,n** Selects how many ADC channels are active. If more channels are active than needed a program will run slower than necessary. This is due to the fact that conversion at each channel occurs sequentially, not concurrently, with each cycle taking 10ms. Thus if you are only sampling at one channel you can obtain about four

times as many samples in a given period if the other three channels are disabled, although there will also be a very minor slowing of the processor due to the extra number of interrupts.

Here, n = 0=disables ADC, 1=enables channel 1, 2=enables channels 1 & 2, 3=enables channels 1, 2 & 3, 4=enables all four channels.

**17,n** Forces ADC at channel n (channels are numbered 1-4, just to confuse you since the sound channels are 0-3).

**18** Clears function keys of stored strings, ie wipes the key buffer at &B00-&BFF.

**19** Waits for next TV frame synch pulse — useful to avoid screen shudder in animation.

**20,n,y** Controls the character set definition in modes other than 7. Normally the character set is said to be 'imploded', and one page of memory is set aside for redefinitions at &C00-&CFF. It is possible to store 32 character definitions per page, and Acorn says that characters &80-&9F may be defined here. In fact any character may be defined here, but if you wish to redefine more than 32 characters it is necessary to allocate more memory. The additional memory is allocated by the y parameter and is set aside just above OSHWM (better known as PAGE). Where n = 0=character set imploded, n = 1=character set exploded.

Memory y Used	Characters officially stored
0 OSHWM	&A0-&BF
1 (OSHWm+&100)	&C0-&DF
2 (OSHWm+&200)	&E0-&FF
2 (OSHWm+&300)	&20-&3F
4 (OSHWm+&400)	&40-&5F
5 (OSHWm+&500)	&60-&7F

It is not possible to redefine the control codes.

**21,n** Allows the flushing of selected systems buffers, n being the buffer number, n = 0=keyboard, 1=RS423 input, 2=RS423 output, 3=printer output, 4=sound channel 0, 5=sound channel 1, 6=sound channel 2, 7=sound channel 3, 8=speech output.

**123** A user supplied printer driver must send this call to indicate to the MOS that it has completed its task.

**124** Reset Escape flag pointer to &FF — the no escape condition.

**125** Set Escape flag pointer — this will follow an escape event.

**126** This call must be sent to acknowledge an escape event.

**137,n** Controls the tape motor relay in a similar manner to \*MOTOR, N = 0= motor off, n = 1= motor on.

**138,n,y** Places the character whose ASCII code is y into buffer number n, buffers are numbered as given in FX21.

**139,n,y** Selects filing system options in an equivalent manner to \*OPT, If n = 1 and y = 0=no messages, 1=short messages, 2=detailed messages. If n = 2 and y = 0=ignore errors, 1=prompt for retry on error, 2=abort operation on error. With n = 3 the Interblock gap is given in y, in 1/10ths second.

**140,n** Selects the Baud rate for the CFS and is equivalent to \*TAPE, n = 3-300 baud, n = 12-1200 baud.

**141** Selects the ROM cartridge system, equivalent to \*ROM.

**142,n** Passes control to the Sideways ROM in socket n. On the unexpanded BBC there are four Sideways ROM (SWR) sockets — the full complement is sixteen. The ROM is selected by placing a number between 0 and 15 into location &FE30. If the four sockets are present the links on the board force them to be addressed as if they were all sixteen.

Thus SWRO, SWR4, SWR8 and SWR12 are all the same ROM. SWR15 is assigned the highest priority and is entered on power-up or a hard reset. This call forces the selection of another ROM language without having to make a service call, eg \*EXMON.

**144,n,y** Addresses the 6845 video controller in the same manner as \*TV, y controls the field interlace, y = 0=interlace on, 1=interlace off, n controls the horizontal position of the picture, ie n = 1=move picture up one line, 2=move up 2 lines etc, n = 255=move picture down one line, 254 down 2 lines, etc.

These changes are only effected at the



next mode change and it is not possible to remove interlace in mode 7.

**147,n,y** Write to Fred Input/Output area, n = offset from &FC00, y = data byte.

**149,n,y** Write to Jim Input/Output area, n = offset from &FD00, y = data byte.

**151,n,y** Write to Sheila Input/Output area, n = offset from &FE00, y = data byte. eg to alter the format of the RS423 transmit sequence, the offset of the 6580 control register is 8. Thus \*FX151,8,y will produce:

y	No data bits	Parity	No stop bits
2	7	Even	2
6	7	Odd	1
10	7	Even	1
14	7	No	1
18	8	No	2
22	8	No	1
26	8	Even	1
30	8	Odd	1

This could be used to configure the printer interface to non standard printers.

The next issue of PCN will conclude our current list of \*FX commands.

# Ready, Set, Draw!



Now, with Melbourne Draw, you can create dazzling, intricate colour graphics and pictures on your Spectrum screen without special programming skills.

Just look what you can do:

- Create more exciting graphics and characters in your own programs.
- Reduce or enlarge images to any size.
- Add special effects and depth to your game backgrounds.
- Enlarge sections of the screen display up to sixteen times for intricate detailing, then reduce them back to their original size.
- Create personalised titles and lettering anywhere on the screen in any direction — even backwards or upside down.
- Control and alter the colours of your Spectrum at will.
- Store all your graphics on to cassette.
- Easily create and define UDG (User Defined Graphics) characters — you can even store your custom UDG areas on cassette.

You can use Melbourne Draw™ to explore all artistic possibilities offered by the exciting new creative medium of computer graphics, and create any illustration or picture you want.



PCN3-11

#### SPECTRUM Books

<input type="checkbox"/> Understanding Your Spectrum	NEW LOW PRICE £6.95
<input type="checkbox"/> Spectrum Machine Language for the Absolute Beginner	NEW LOW PRICE £5.95
<input type="checkbox"/> Over The Spectrum	NEW LOW PRICE £4.95
<input type="checkbox"/> The Complete Spectrum ROM Disassembly	£9.95
<input type="checkbox"/> Spectrum Hardware Manual	£5.95
<input type="checkbox"/> Spectrum Microdrive Book	£5.95
<input type="checkbox"/> Supercharge Your Spectrum	£5.95

Please send me your free 48 page catalogue

#### 48K Spectrum Cassettes

<input type="checkbox"/> Penetrator	£6.95
<input type="checkbox"/> The Hobbit	£14.95
<input type="checkbox"/> Terror Squad 4D	£6.95
<input type="checkbox"/> Melbourne Draw	£8.95
<input type="checkbox"/> R.U.R.G.	£14.95
<input type="checkbox"/> Computer Bridge	£8.95
<input type="checkbox"/> Abersoft Fort	£14.95

All prices include VAT where applicable. Please add 80p for post and pack.

Orders to:  
Melbourne House  
131 Trafalgar Road  
Greenwich London SE10

Correspondence to:  
Melbourne House  
Tring  
Hertfordshire

Trade enquiries welcome

All Melbourne House cassette software is unconditionally guaranteed against malfunction.

Access orders can be telephoned through on our 24 hr ansafone (01) 858 7397.



I enclose my cheque/money order for £.

Please debit my Access Card No.

Expiry Date

Signature

Name

Address

Postcode

£	
£	+ p/p .80
Total	
£	

Ted Ball meets his Spectrum's mentor and asks if it's a toolkit or an editing package.



# What's my line?

When you are writing a Basic program you often want better editing facilities than are provided in your computer. Mentor, for the 16K or 48K ZX Spectrum, gives you a number of block and global editing commands to supplement the Spectrum's built-in line editor.

## Features

The editing functions provided in Mentor are:

**Renumber** This changes the line numbers so that they are in a neat sequence, and also changes the line numbers in GOTO and GOSUB statements. However it will not change the GOTOS and GOSUBs if the line number referred to does not exist or if the line number is specified by an expression.

**Block text operations** These functions allow you to move a block of lines to a different part of the program, copy a block of lines to a different part of the program, or delete a block of lines. The operations are normally followed by an automatic renumber, but you can suppress this if you wish.

**Search operations** With these functions you may search the program for any string, which can include Basic keywords; search for GOTO and GOSUB statements that contain a line number; or search for GOTO and GOSUB statements that contain an expression. If the search is successful the line is displayed, and you can continue to search the rest of the program.

**String substitution** This allows you to specify target string and a replacement string. Also, Mentor will search the program, displaying the lines containing the target string and give you the option of substituting the replacement string at each occurrence.

**Variable dump** This allows you to display the program variables in the form they are

stored in the Spectrum (as explained in Chapter 24 of the Spectrum manual). The variable name is displayed in ASCII characters but the rest of the data is displayed as the hexadecimal values of individual bytes.

## Presentation

The cassette is clearly labelled and has two copies of the Mentor program recorded on one side.

The documentation consists of three pages copied from a typed original. Although it describes all the functions included in Mentor and gives the syntax for the commands, it is not easy to follow.

## Getting started

Getting Mentor up and running is rather a tedious job that could have been made easier. First you have to load the machine code, then run it by typing in a USR command. Then you have to work through a title screen and five screens of instructions. It's the fifth screen that contains the instructions for actually getting Mentor relocated and running.

## In use

Once you have Mentor loaded and running you can type in or load your program from tape, and use the Mentor functions for editing. However, it takes a little time to get used to the commands, as they are not clearly explained in the documentation and you have to experiment to find out exactly how the commands operate.

For example, to move a block of text you have to type in "MTX a,b,c" and the documentation says that "This moves the text between lines b,c to line a location". However, it is not until you have tried it that you find that the block that is moved includes line b, does not include line c, and that the block ends up immediately in front of line a.

Most of the functions operate almost instantaneously, but the renumbering takes an appreciable time. Mentor took 27 minutes 10 seconds to renumber the 370 line program I used to test it on. That may not be much slower than most renumber programs, but it's a long wait when it happens after every move, copy and delete.

## Reliability

I could not find any bugs in Mentor. It gives an error message if you type in invalid commands such as trying to move non-existent lines. It also gives error messages if renumbering would give a line number greater than 9999 or if there is not enough memory left to carry out a block copy operation.

## Verdict

The documentation describes Mentor as a 'toolkit', but it is really an editing package. You could reasonably expect a toolkit to include debugging aids as well as the editing functions, but the only debugging aid in Mentor is the variable dump and this does not display the variables in a suitable form to help you debug a Basic program.

The editing functions are useful, but you have to specify a block of lines by giving the numbers of the first line in the block and the line following the last line of the block. And that certainly doesn't make for ease of use.

## RATINGS

Features  
Documentation  
Performance  
Usability  
Reliability  
Overall value



Name Mentor Application Basic program editor  
System ZX Spectrum, 16K, or 48K Price £ 9.95  
Publisher JK Gosden Software, Timeslip, 13  
Ashted Common, Ashted, Surrey KT21  
2ED Format Cassette Outlets Mail order

Tony Hamstead

- This is an entirely new computer system. It was designed with both eyes fixed firmly on the future. So that whatever shape the future takes, we'll be able to fit it into the system. Just as simply as the peripherals and software already available fit into the system. That way the system will grow with you. And you'll never get left behind.

- Based around the Z80A microprocessor, and utilising Microsoft™ BASIC, Aquarius™ has 8K ROM and 4K RAM resident within its console. It is able to provide up to 16 colours and resolution of 320x192, and generates its sound directly through the television's speakers.

- With twin cartridge ports, the mini-expander allows simultaneous use of additional RAM and software cartridges. Twin disc game hand controls are included and the unit provides two additional sound channels. The 16K RAM cartridge plugs into either the console or the mini-expander, increasing Aquarius™'s RAM capacity to 20K.

- With the ability to reproduce the entire graphic and character set of Aquarius™ at 80 characters a second, the printer's 40 column output allows transcription of the complete monitor image.



- Using standard audio cassettes, the data recorder provides storage for programs and information, and allows the use of cassette based software. Incorporating a digital tape counter and transmission indicator, it operates sequential searching.

- A large number of games, designed to take advantage of Aquarius™'s sophisticated colour and sound capabilities, are available on cartridges that plug into the console either direct, or through the mini-expander. Cassette based games can be used via the data-recorder.

- A wide range of preprogrammed cartridges is available, including the LOGO teaching program and practical home data systems like FILEFORM™ and the spreadsheet calculator package, FINFORM™.



**AQUARIUS™**  
A HOME COMPUTER SYSTEM

WITH AQUARIUS, YOU WON'T GET LEFT BEHIND.

MATEL ELECTRONICS®

WHATEVER HAPPENS  
IN THE FUTURE, IT'LL  
FIT INTO THIS SPACE.

MATTEL ELECTRONICS®  
**AQUARIUS**™

# SKI RUN



**SKI RUN**  
All the excitement and skill of the ski slopes with downhill, slalom and giant slalom. Put yourself to the test and record the fastest time! Nine levels of difficulty. High quality graphics and brilliant sound effects!!

# Boom Software

## It will blow your mind

**LOGGER MANIA**  
Can you dodge the traffic, jump your logs, slip the bears, and get home before sunset? A game with a difference written in all machine code with high quality graphics.

# LOGGER MANIA



**SPACE RAIDER**  
Engage in a furious intergalactic intelligence battle. As you try to blast and outwit the fast developing alien star ships. Incredible sound effects, smooth high resolution graphics in this top quality arcade action game.

# SPACE RAIDER



**ANNIHILATOR II**  
Defend your planet against a mighty alien invasion. All machine code makes for fast and brilliant arcade action!

# ANNIHILATOR II



Post this coupon now to Boom Software  
2-4 Chichester Rents, Chancery Lane,  
London WC2A 1EG

Please send me the following:

Ski Run	£5.50	Annihilator II	£5.50
Logger Mania	£5.50	Space Raider	£5.50
Annihilator II (VIC 20)	£4.75	Trek (VIC 20)	£4.75

Total cheque/PO enclosed £ ..... payable to 'Boom Software'

Name .....  
Address .....

**Commodore**   
and VIC 20

Does Stock Control really tally with running a small business? Bill Quentin loads it up.

The program provides a basic stock control system for the small business. It is a stand-alone system and cannot be linked to other Kemp products, such as the Sales Ledger. This means that all the records must be entered on a daily or weekly basis, increasing yet again the book-keeping requirements of the business.

### Features

Stock Control is like a card index file in that every stock item has a page in the program. These pages can be created, deleted, corrected or displayed according to the wishes of the operator. Here are the print-outs that are available:

<b>STOCK LISTING</b>	Stock number
	Stock description
	Stock level
	Reorder flag
	Stock value
	(for all individual stock items)
<b>STOCK VALUE</b>	Total stock value
	(for the whole stock)
<b>REORDERLIST</b>	All items to be reordered
	Stock numbers
	Stock description
	Cost
	(for the whole stock)

The reorder list can only be reproduced on the printer. Records of stock changes, deletions etc can also be printed.

Stock Control's search facilities are primitive, allowing a match of only the first four letters of either the stock description or supplier's name. In most cases it's considerably easier to perform a full stock listing and grab the information as it scrolls up the screen.

The program provides the following information on each stock item:

Stock number	4 characters
Stock description	20 characters
Supplier description	4 characters
Unit cost	000 000.00
Reorder level	7 figures
Present stock	calculated by program
Value	calculated by program.

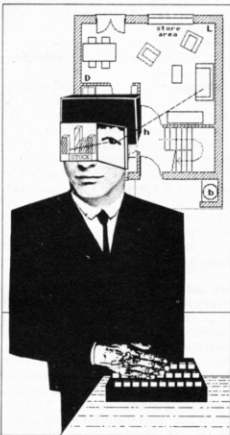
### Presentation

Stock Control, like the other programs from the Kemp stable, comes in a very attractive box with a beautifully printed leaflet.

Kemp should put far more material into its manuals, as 8 pages of A6 is scarcely enough space to describe the operation of the program, never mind detailed information about operating a stock control system. It is important that programs designed to introduce the user to business systems, such as stock control, should not assume prior knowledge of operating such a system.

The manual is an adequate reference for general operation for the program, although there is neither an index nor a list of contents. The text is succinct and when read in conjunction with the on-screen

# The stock answer on Spectrum?



comments allows the user to get the program flying without undue fuss.

It is a pity that more use wasn't made of the Spectrum's considerable graphics capabilities.

### Getting started

The program takes about ten minutes to load-verify and save-verify, which are the minimum operations required for any transaction. This limits its use to end of the week summaries rather than a real-time system to be used in a store-room.

On entry into the program you are asked for the date, then confronted with the main menu. This is a list of all the various functions which can be performed by Stock Control. Option number 6 gives a complete listing of the stock, number 4 allows you to create a new record, and so on. It would be helpful if the selected option was described on the resulting display screen by more than its function number. Several screens are identical and it is easy to enter the wrong mode by mistake.

Only a cursory knowledge of the Spectrum is required to operate the program. The main area likely to cause problems is the saving, loading and verification of the program and data on cassette. A mistake by the operator, or a tape loading error, will require a BREAK

and GOTO instruction.

### Ease of operation

Stock Control can be learnt in under an hour, but it might take weeks to fully understand the stock-control techniques necessary to integrate this package into a practical business.

The cassette contains a demonstration program followed by a working copy. The demonstration copy has a set of figures already installed and is therefore a useful training aid. The manual tells you to verify the program after loading it from cassette.

### Reliability

A sample stock of 30 items was entered into the program for testing purposes. All the functions of the program were checked without encountering a software error. The data was saved-verified and then load-verified a total of 20 times without dropping any data.

The program uses the standard Spectrum routines for checking and verifying, data being dumped to and from memory, and therefore has some protection against data corruption.

Kemp supports all its software during normal office hours which makes for rapid problem solving should any untoward occurrences happen during program installation or operation.

### Verdict

The program is easy to use and will find a ready market with small businesses needing more information about their stock. Stock Control will not, however, reduce the amount of book-keeping required to operate effective stock control.

It is unfortunate that the search facilities are so limited as surely the main advantage of a computer is to reduce the time taken to find stock records. Equally, I was disappointed to find that this program couldn't be linked with other Kemp programs so as to allow a sales ledger entry to automatically alter the stock levels.

The program is most definitely not designed to be operated in real-time. It would be most difficult to keep an up-to-date stock record by using this program to record each 'nut and bolt' being removed from the stock room. The problem with attempting this sort of application is the length of time necessary to load and save from a cassette. Kemp is presently developing a Microdrive version of Stock Control which may go some way towards alleviating this problem.

<b>RATING</b>	
<b>Features</b>	■
<b>Documentation</b>	■
<b>Performance</b>	■
<b>Usability</b>	■
<b>Reliability</b>	■
<b>Overall value</b>	■

**Name** Stock Control **Application** Accounting  
**System** Spectrum **48K Price** £14.95 **Publisher**  
Kemp Ltd, 43 Muswell Hill, London N10 3PN,  
01-445499 **Format** Cassette **Other versions** none  
**Outlets** Mail order (soon to be distributed nationally)

Colin Cohen looks at five educational games for home or school use on the BBC Model B.

# Learning as you play

Even though you might find it far-fetched, it's nevertheless possible for a four-year old (or younger) to manipulate a computer providing that a suitable program is run. So program quality has to be judged not only on its originality, usefulness and technical competence, but also its kid-proofness. This means that all the keys not needed for control are disabled and that pressing a legal, but incorrect, key is not too disruptive. For the supervising adult this can be a little difficult as the Escape and Break should be disabled — Escape often to take you back to a menu and break only usable in conjunction with SHIFT/CTRL.

It goes without saying that the program should also load first time round, and it's often a help if the RETURN key does not need to be used after entering a choice to exit a menu.

## Visual and memory skills

**Facemaker** (age range 5-12). As with all the programs in this series it starts with an attractive title page while the program loads in six stages. The packaging and documentation are good. The latter is perhaps over-cautious in starting with the instruction "TAPE, presumably in case you are using a disc system. Each tape is marked with the loading time, repeated on the screen.

Before drawing a face the child enters their name and the subjects: the software automatically inserts a capital for the first letter before the drawing starts. The compilation of the drawing is on an indentical basis whereby the child is asked a series of questions about the person being drawn and the appropriate features are displayed each time 'return' is used.

The speed with which a child can work this program will depend on the ability of the child to read the choice of words offering the different features. As with the other programs in the series a couple of neat graphic symbols are used — a finger pointing at the space-bar appears when the next stage of the program is needed and a smiling face in a question mark if the computer does not expect the answer given. Sometimes the latter is replaced by

just a beep.

At stages throughout the program the child is given the chance to go back over the last stage and redraw if the face being drawn does not come up to expectations. It has to be said that although there are apparently about 1,000,000 permutations, faithfulness to life is not the program's strongest suit, and even the Beeb is not quite up to the graphic standards of the documentation.

The question 'is the subject male or female?' seems to have more effect on the prompts than on the finished result. The value of the program is clearly in the thought process that it stimulates, but it is a pity that although the information has been asked for, the final picture cannot be captioned 'X's portrait of Y' or something similar. It took my five-year old about thirty minutes to draw and revise her first face.

It's also a pity that BREAK is not trapped as the program can't be OLDED.

**Hide and Seek** (age ranges 5-12). This is a Happy Families/Hide and Seek type game which certainly has better graphics than earlier ones I've seen. There's a choice of several variants, the first of which (Find it) places objects in six boxes and then covers them. One of them is then displayed and the space bar is used to move the cursor to the corresponding location. There is gratifyingly good sound for a 'find', and as with all ASK programs, the sound level can be varied with CTRL/S.

Seek uses a three by three grid. There are four variants, some of which require the child to place the pictures in the boxes and some of which do it for you. One version blanks out each picture the moment it is in position. Finally, the What's Missing version involves spelling ability, with a lexicon of 36 words.

## Numerical skills

The programs in the series are counting aids, starting with *Let's Count* which is genuinely for children from three upwards. Only the numbers 1-9 are used and the cursor is moved with the space bar. If you overshoot the cursor starts to backtrack to

allow a second or third attempt. In two of the games (Treasure Island and Space Stations) matching numbers of objects have to be grouped, with a sea shanty or a rocket launch as a reward.

In *Which Way*, equal or unequal numbers of red and blue 'objects' are displayed and the child has a choice of two or three alleys to send them down, depending on which there are more of. It's only on this last one that the documentation is less than satisfactory.

**Number Gulper** (age range 5-12). This may be the only program in this series too difficult for the youngest of the group for which it is intended, or even their parents. There are many different levels (numbers from 1-9999 can be selected) and the whole exercise takes place against a clock. Choose a make number and the computer chooses a made number. Gulper has to be steered round the board gulping the numbers which produce the make number when added or subtracted from the made number.

I found the gulper difficult to control and the program not quite crash-proof: the space bar should pick up the number and add/subtract it to/from the made number. I found it could pick it up without doing the maths.

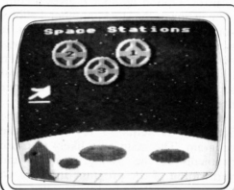
**Number Puzzler** (age range 4-12). This is the most difficult game in terms of the number of different levels available and in the mixing of addition and subtraction. You can play against a friend or the computer, but the latter tends to be too fast for a child to see what is happening.

The first games are a sort of musical noughts and crosses and easy enough to grasp, though much more difficult to play against the Beeb than ordinary noughts and crosses. Magic square is even more difficult and requires a very good understanding of numbers.

Price £9.95 each Publisher ASK Ltd, London House, 68 Upper Richmond Road, London SW15 2RP, tel 01-874 6046 Format Cassette (disk soon) Language Basic and machine code Other versions Vic 20 Outlets Acornsoft and retail.



Portraiture in Facemaker.



Lift off in Let's Count.



Number Gulper for 5 to 12-year-olds.



## FOR THE BBC MICRO SOFTWARE

**TINY PASCAL** — Pascal-T is a 16k Eprom program capable of compiling Source Pascal into a compact and very fast threaded-interpretive-code. Full editor and disc-support are included and the program is supplied together with comprehensive documentation.  
**PRICE £59.00 + V.A.T.**

**X CAL** — An eXpert Computer Aided Learning package in 16k Eprom and support disc. No programming skill required to construct learning 'sessions' as the program is 'screen' driven. Facilities include Text pages, Graphics and Histograms.  
**PRICE £65.00 + V.A.T.**

**FORTH** — FIG-FORTH in 8k Eprom together with manual.  
**PRICE £34.72 + V.A.T.**

**LOGO-FORTH** — A 16k Eprom program introducing this very powerful but extremely friendly Turtle-Graphics language. Users also have full access to the Fig-Forth support nucleus. Full documentation is included.  
**PRICE £59.00 + V.A.T.**

*(Special discounts available for educational establishments for all the above software)*

## HARDWARE

Always in stock Printers, Disc Drives IC's etc.

## FOR THE EPSON HX20

**SOFTWARE** — FORTHROM including full documentation. **£34.72**

**HARDWARE** — Expansion Unit, Paper, Microcassettes etc.  
*Please phone for quotes*

Retail/Mail Orders/Dealer enquiries to:  
**HCCS ASSOCIATES**  
 533 Durham Road, Low Fell, Gateshead,  
 Tyne & Wear NE9 5EY. Tel. (0632) 821924

Retail sales also at:  
**HCCS MICROCOMPUTERS**  
 122 Darwen Street, Blackburn, Lancs. Tel. (0254) 672214

PCN 3/11

## PRINTER BONANZA!

**EPSON**

PRINTERS AT UNBEATABLE PRICES

EPSONRX80T £225 + VAT	STAR510 £245 + VAT
EPSONRX80FT £253 + VAT	STAR515 £355 + VAT
EPSONFX80 £337 + VAT	CT1CP80 £255 + VAT
EPSONFX100 £485 + VAT	MT80 £270 + VAT
EPSON MX100 £390 + VAT	

SEIKOSHA GP 700A £377 + VAT

THE NEW 'STAR' AND 'CP' PRINTERS —  
 AS GOOD AS EPSON

STAR & EPSON — THE BEST ON THE MARKET.



All printers carry a 1 Year Guarantee and come with paper. Shipment is by TNT Overnight Express to your door — Please add £7 + VAT carriage.

Payment by Cheque, Access, Visa etc.

As our prices vary from week to week send for our full weekly stock/price sheet which will cost you only a 5ae.

Shipments throughout UK. We can export to most countries in the world.

Please phone for Access or Visa buying details.



**IMMEDIATE DELIVERY.**

## Micro-Spares

We cannot and will not be beaten on Price!

Note our change of address  
 104-106 Hanover Street, Edinburgh EH2 1DR  
 031-226 3345

# DATA DUPLICATION

At Kiltdale, we provide the professional data duplication service.

More and more companies are turning to us to provide the quality of reproduction and speed of service that cannot be matched. Come and join the growing number of satisfied

clients — from individuals, to hardware manufacturers such as Commodore and Dragon, to software specialists such as Imagine — who have discovered the benefit of working with professionals.

Kiltdale Ltd, Liddington Industrial Estate  
 Leckhampton, Cheltenham, Glos.  
 Tel: (0242) 25458  
 (0242) 583638



# Kiltdale

QUITE SIMPLY THE BEST



# SIR COMPUTERS LTD CARDIFF



## SIR ROM EXTENSION BOARD

THE ROM BOARD FOR THE BBC MICRO

- ★ Easy to install, no soldering, full instructions provided.
- ★ Allows up to 256K ROM space.
- ★ Fits easily inside BBC case.
- ★ Price: £40.25 (+ £1 p+p).

## electron.

Acorn ELECTRON Computer £199  
THE SIR ELECTRON PERIPHERALS  
RANGE: now available:

- ★ PRINTER/JOYSTICK PORT
  - ★ ROM EXPANSION BOARD
- Please telephone for full details.  
Coming soon: 'MODE 7' ADAPTOR

### BBC MICROCOMPUTER

BBC Micro Model B ..... £399  
BBC Micro Model BD ..... £489

### SPECIAL OFFERS while stocks last

PL Graphics Digitizer ..... £75  
Jupiter Ace Micro ..... £49

### SOFTWARE

Our range covers over 20 software houses. Please write for further details.

### COMPARE OUR PRICES!

#### PRINTERS

Dot Matrix:  
Epson FX-80 ..... £399.00  
Epson RX-80 ..... £275.00  
Epson RX-80 F/T ..... £299.00  
Shinwa/CT1 CP-80 ..... £263.35  
**Daisywheel:**  
Juki 6100 ..... £425.00

#### DISC DRIVES

100K (Single) ..... £199  
2x 100K (Dual) ..... £349  
2x 400K (Dual) ..... £689

#### MONITORS

Sanyo Black/Green 12' ..... £85  
Microvitec CUB 14' Colour ... £269  
Kuga Vision 112' Colour ..... £280

ALL PRICES ARE INCLUSIVE OF V.A.T.

Address all enquiries to:

**SIR COMPUTERS LTD. (DEPARTMENT H11)**  
91 WHITCHURCH ROAD, CARDIFF CF4 3JP  
Tel: (0222) 21341/621813

**DEAN**  
burst the price bubble  
of the AlphaCom 32

**SPECTRUM COMPATIBLE**

This thermal printer, now available in the UK, is the standard printer which has sold in tens of thousands for use with the American version of ZX81.

**£59.95** inc VAT  
ADD £2 P&P

DEAN ELECTRONICS LTD  
Glendale Park, Fernbank Road,  
Ascot, Berkshire SL5 8JB  
Tel. 0344 885661 Telex 849242

Due to an exclusive distribution agreement, DEAN are now able to offer the ALPHACOM 32 Thermal Printer at the fantastically reduced price of £59.95 inclusive of VAT. Includes full interfacing to the ZX81 or Spectrum. Uses the standard Sinclair print commands (COPY, LLIST, LPRINT). Quiet, maintenance-free - high-speed thermal printer. Paper rolls only £1.00 per roll - 25 metres long.

Also available from selected branches of WH Smith.

Please send me ..... Printer(s) at £61.95 and ..... boxes of paper (10 rolls per box) at £12 per box - all inclusive of post and packing.  
Total £ ..... cheque / PO enclosed or debit my Access/Barclay card account No. ....  
Name and address .....

John Lettice reveals a low-end micro printer lurking inside a cheap, portable typewriter

# Oh Brother!

The Brother EP-22 is claimed to be the world's smallest electronic typewriter, but it's a lot more than that. It's battery/ mains, and a built-in RS232 interface means that, for under £170, you can get a reasonable quality printer for your micro. The entire set-up costs you less than some of the interfaces you can get for the pricier electronic typewriters, and — initially at least — the RS232 screams Interface 1 at you loud and long.

The EP-22 in this sense could provide a toe-hold in word processing for many an owner of a low-end micro.

## Presentation

The machine comes in a fairly durable box, with a couple of wedges of polystyrene inside. The packing seems firm enough, and inside this you find the Brother tidied away in its carry case, so it's not likely to come to a great deal of harm in transit.

The case itself is something else. It's around 31cm x 23cm x 5.5cm, with all the bits you're liable to need securely clipped into place. There's a fold out carrying handle, and a plastic cover for the RS232. The latter has a special place inside the lid where you can clip it when you're using it as a printer.

The inside of the lid also has clipping space for two spare carbon ribbons, and a plastic band to hold a couple of sheets of paper or documents in place. The base of the machine doubles as the bottom of the case. Ergonomically speaking it's all very pretty.

## Features

The EP-22 is a plain paper, thermal printer/typewriter that will take standard A4 sheets, and will give you anything up to 75-column printing, although at this width your margins will be non-existent. Practi-

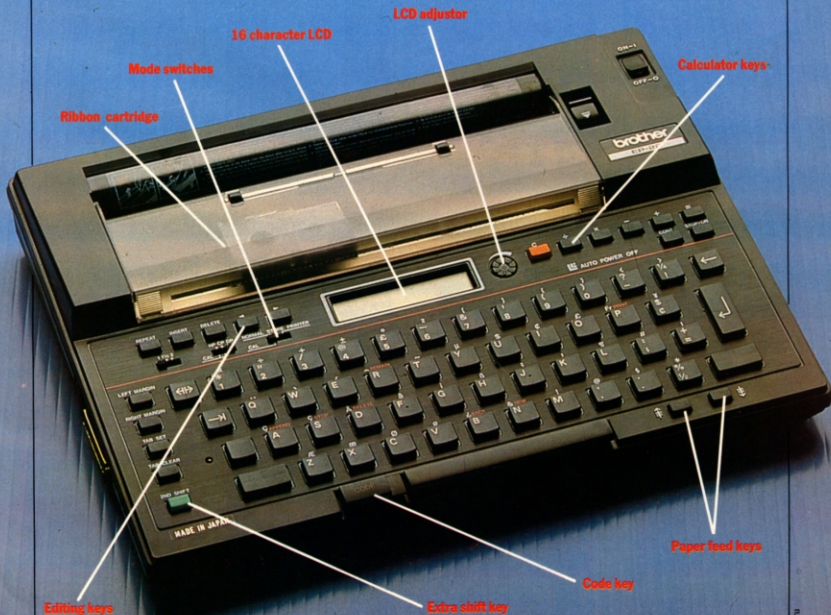
cally, you're therefore talking about 64 columns. It has a standard qwerty keyboard, but with a second shift that allows you three characters from most keys, plus a calculator mode that gives you a few basic arithmetic functions.

It has three basic printing modes — non-printing (where you can store up to 2,015 characters, or about a page of A4, in memory for printing out later, corrected printing (where it prints out 16 characters behind the ones you're typing, allowing you to correct as you go) and direct printing (where it acts as a normal typewriter). It has no descenders but is much more legible than some other printers.

It's difficult to see what you're typing through the smoked plastic cover, but there's a 16 character LCD that shows what you're typing as you type it in, whatever mode you're in. Carriage return is not automatic, even when you're typing into memory, so you have to hit return every time you hear the beep.

When used as a printer, the EP-22 has a transfer rate of 300 and 75 baud, with a 78-byte buffer. The information given on using the machine as a printer is fairly

▶ 43



# ANIROG SOFTWARE

24 HR. CREDIT CARD SALES SERVICE (02934) 6083  
 PAYMENT BY CHEQUE, P.O., ACCESS/VISA  
 8 HIGH STREET HORLEY, SURREY.  
 Overseas 50p post & packaging  
 TRADE ENQUIRIES WELCOME  
 29, West Hill, Dartford, Kent. (0322) 92513/8

## COMMODORE 64

KONG

KB / JS

£7.95

A 31 K ALL M/C PROGRAM WITH BRILLIANT ANIMATED GRAPHICS



1. CHASING FIREBALLS AND BARRELS CAN BE SMASHED BY THE MALLET IF YOU CAN JUMP UP AND GET IT.

2. JUMP OVER THE PIES AS YOU RUN ALONG THE CONVEYOR BELT MAKE SURE YOU DONT END UP INSIDE THE COOKER.

3. THE ONLY WAY UP IS BY THE LIFT WHICH IS UNDER A CONSTANT BARRAGE OF LADDERS

4. KNOCK OUT ALL THE SUPPORTS BY RUNNING OVER THEM AND WITNESS THE SPECTACULAR COLLAPSE OF KONGS LAIR.

### SKRAMBLE

J.S.

£7.95

PILOT YOUR SPACE CRAFT THROUGH THE SIX DEFENCE SECTORS AND DESTROY THE COMMAND MODULE OF THE COBRON EMPIRE. A 32 K ALL M/C BLOCKBUSTER.



1. RAMMING MISSILES HURTLE TOWARDS YOU.

2. FIGHT COBRON QUASER ION SHIPS

3. DODGE THE FIREBALLS, BECAUSE YOU CANT SHOOT THEM DOWN.

4. CITY WITH HIGH RISE BUILDINGS



5. GUIDE YOUR SHIP WITH DEXTERITY THROUGH THE MAZE

6. DESTROY THE BASE BEFORE YOU RUN OUT OF FUEL.

### HEXPERT

J.S.

£7.95

THE EVIL WITCH ZOGANAAR HAS FORCED BERT TO PLAY ON HER 3D HEXAGONAL PYRAMID AS HE JUMPS FROM STEP TO STEP OF THE PYRAMID MASSIVE RUBBER BALLS BOUNCE DOWN THE PYRAMID TO CRUSH HIM, HER PET SNAKE, COILY, MOVES UP AND DOWN THE PYRAMID CHASING BERT. YOU HAVE TWO SPINNING DISCS TO JUMP ON TO AND LURE COILY TO HIS DEATH. CAN YOU MAKE BERT THE HEXPERT? A SUPERB ALL M/C GAME WITH EXCELLENT 3D GRAPHICS.



### MOON BUGGY

### 3D TIME TREK

### DUNGEONS

### FROG RUN



EXPERIENCE ALL THE THRILLS OF THE ARCADE GAME AS YOUR PATROL CRAFT MANOEUVRES OVER THE GIANT POT HOLES.

A 3D STAR TREK GAME WITH REAL ARCADE ACTION BATTLE WITH THE ALIENS.

ENTER THE REALMS OF FANTASY WITH SUPERB USE OF SPRITE GRAPHICS BATTLE WITH THE FEARFUL FIRE BREATHING RED DRAGON

A POPULAR ARCADE GAME BROUGHT TO LIFE WITH BRILLIANT ANIMATED GRAPHICS

J.S.

£7.95

K.B. / J.S.

£5.95

K.B.

£6.95

K.B. / J.S.

£5.95

41 sketchy, although the codes are better presented than in the manuals of some considerably more expensive printers.

**In use**

Getting going in typewriter mode is easy enough. You slip a sheet of paper behind the roller, press the index key, and watch the roller pull in the paper. You then lift the dust cover, press paper release and adjust to your taste, close the cover, close paper release and you're off.

You're now ready to type away; the size of the unit means that the angle of the keys isn't all it might be, and the keys are relatively small, but I found I soon got used to them. One peculiarity about the keyboard is that I found it considerably easier to type with the thing on my lap than on a desk — if you think about it, this is an advantage in a portable.

But if you're typing away direct, you'll run into Tippex troubles when you try to correct. Pouring correction fluid into the works of this one doesn't seem such a smart idea. The corrected printing mode is obviously the answer here.

Printing quality is nothing to write home about, but is good enough to serve its purpose. When you're using the carbon ribbon you get a relatively grey overall look, but photocopying experiments showed that the density of the little black dots was great enough to produce adequate copies.

You get into thermal printing by taking out the carbon ribbon and using thermal paper (the stuff supplied was white and standard A4 size). The manual doesn't tell you this, so you could spend a fruitless hour or so looking for the relevant — and non-existent — mode switch.

Thermal printing is in a tasteful blue, and is very easy on the eye — this, however, doesn't photocopy as well as the carbon ribbon. You can't take carbon copies — the Brother is a bit fussy about the thickness and texture of paper you use — and this is where the 2K memory comes in. The theory is that you type your page, store it, then print out the number of copies you require.

Using the machine as a word processor will take a little getting used to, if only because the people most likely to buy it won't have much experience of them. They'll either be owners of cheap micros, or they'll be businessmen who normally have someone else doing their typing. One idiosyncrasy is that you seem to have to do all your editing on page — you can't add copy in the middle of a file stored in memory.

The most obvious goof to make is to forget to tell the machine when you want to store text, as it doesn't tell you when you're wasting your time. The way you store is to switch the mode switch to Store, press the code button (left of the space bar) and 'a', and respond 'y' to the question 'New text?' You can then be in no-print, corrected print or direct print, and still store what you're typing.

Once you've finished typing, press the stop key, and 'Store stop' appears in the

LCD. The text is then in the memory, even if you switch off the machine.

You can use a number of methods to insert or delete. You can use the keys marked as such for the odd character, while code/b deletes the last 16 characters, and code/n deletes the lot. The manual has a nice little picture showing the question 'Delete text?' at this point, and says that no deletion is made if a key other than 'y' is pressed. I was initially unable to achieve this happy state, but I later discovered that it was just saying 'New text?' and although it looked like all was lost, it wasn't.

Insert is a lot safer, and you're given fairly clear instructions as to how you prepare form letters and the like, with plenty of examples of use.

Using it as a printer is another matter. The manual is user friendly up to this point, with lots of little pictures showing you what to do, but here you're just told how to switch it into printer mode and change the baud rate. You're then given a couple of



Top right: The EP-22 is slightly smaller than a briefcase, complete with fold-flat handle. Right: The 16-character LCD display.



tables showing you what the technical details are, but apart from that you're on your own.

In order to be able to use it as a printer, you need the correct cable between the Brother and your micro. Lowe Computers, the main distributor for the EP-22, is currently making up cables for the Colour Genie and the BBC, but has no plans to produce them for other micros. So if you do buy an EP-22, it would make sense to get your dealer to make up a cable at the same time, and make sure it works with your machine.

After an hour or so of wrestling with the Brother as well as one another — a team of PCN specialists managed to get it working with a Tandy Model 100. It didn't work at all at 300 baud, and we put this down to slight variations between what the Tandy thought was 300 and what the Brother thought was. After a little tinkering, 75 baud did the trick, so it is possible, and this duo would produce you a very nice portable system.

There should be less trouble linking up the Brother to the BBC or the Genie, but you'll almost certainly run into a few brain-bending problems with other micros. It can be done, and you'll be able to get it done, but it's a pity, considering the effect the EP-22 could have on the printer market, that you won't get more help.

As regards formatting, it seems that you'll have to do most of this through software. The line spacing key on the printer is operative when you're on-line, but the margins are not. So things like word wrap-round and justification need to be handled by your micro.

Standard continuous stationery will fit, although you'll have to rip off the tractor

feed holes first, and you'll again have to handle page breaks through software.

The machine is powered either by four U2 type batteries, or by a 6V DC power source. Brother has a standard PSU which will operate with it, but even if you are using it with a mains supply it uses the batteries to retain memory when it's switched off.

The PCN test machine ran quite happily on batteries alone during the test.

**Verdict**

At £170 the EP-22 just has to be a good deal. It's worth the money as a typewriter, never mind a portable typewriter, and for a word processor — albeit an idiosyncratic word processor — and printer it's nothing less than a bargain.

Granted, you may have interfacing problems, the print isn't daisywheel quality, and you don't get descenders, but you get all these problems with printers at double the price. And the machine is so quiet that you could use it as a portable typewriter in situations you'd otherwise never have dreamed of.

Of course, there are limitations. You can't — I think — do anything other than text output, and although the print output is perfectly acceptable, it isn't what you'd expect from the high powered business person Brother would no doubt like to buy it. But at this price you have to sacrifice some flexibility, and as it is it's well worth the cash. Roll on the EP-23...

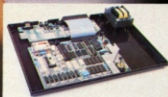
**News** Brother EP-22 electronic typewriter/printer Price £169.95 **Outlets** Office equipment suppliers, Colour Genie dealers **Contact** Lowe Computers, Matlock 4995

# Power to your Fingertips.



All keys on the FDS keyboard contain all the Graphic Characters of the ZX Spectrum

Microdrive interface 1 easily adapted to fit inside the case



Transform your Spectrum with the FDS Keyboard and feel the newly acquired power flow from your fingertips as you enter data with lightning fast accuracy.

The Fuller FDS Keyboard has been especially designed for the professional user. This elegant, slim line, desk top system has a keyboard that inclines toward you and contains all the graphic characters of the ZX Spectrum, plus, additional function keys, shift keys on either side and a space bar. With all the entry keys double size, lightning fast accurate data entry is now made easy. Other amazing features of the FDS include:- Gold plated key switch contacts, guaranteed for 10<sup>6</sup> operations. 4 cursor control keys, 2 functions for direct entry into E mode.

Based on the popular FD42 system, the Fuller FDS is simple to install; it requires no soldering or technical knowledge. For the user who is reluctant to install his computer circuit board inside the FDS, a buffer is available (£8.75 + 80p&p) which simply plugs into the expansion port and connects directly to the keyboard.

**£49.95**  
+£2.50 p&p.

**Fuller** MICRO SYSTEMS

Fuller Micro Systems  
The ZX Centre, 71 Dale Street,  
Liverpool 2. Tel: 051-236 6109.

At Fuller Micro Systems we strive to maintain the highest quality in both research and development, ensuring our products are the very best, we have now built a brand new mail order department to ensure our service is also the very best. Our stock includes a full range of components and kits that will make the most of your Spectrum, all our products enjoy an excellent reputation for reliability and carry a world-wide one year guarantee

Please supply me with..... FDS Keyboard(s).  
I enclose a cheque/PO payable to  
Fuller Micro Systems for .....or debit my credit card.  
Card No.   Barclaycard  
 Access Card  
Signature .....  
Name .....  
Address .....  
Fuller Micro Systems, The ZX Centre,  
71 Dale Street, Liverpool 2. Tel: 051-236 6109



## NEWNES TECHNICAL BOOKS

# FORTH for Micros

NEW

Steve Oakey

Forth is a relatively new language which is catching on with micro users – its easy to use and much faster than BASIC. This book teaches the reader to program in FORTH and demonstrates the use and power of this extensible language.

★ covers the different versions of the language

★ special section on Dragon FORTH and Jupiter Ace FORTH

Softcover £6.50

Available now from your nearest bookseller



**N**ewnes Technical Books  
Borough Green, Sevenoaks, Kent TN15 8PH

### ORIC-1 SOFTWARE COMPARE THESE PRICES

XENON-1	UK	£7.50
INVADERS	UK	£6.75
REVERSE	UK	£5.95
FANTASY QUEST	UK	£5.95
3D MAZE & BREAKOUT	UK	£6.75
CANDYFLOSS & HANGMAN	UK	£6.75
ZODIAC	A&F	£6.20
DEATH SATELLITE	A&F	£6.20
SECTOR 7 GAMES PACK 16K		£5.50
SECTOR 7 GAMES PACK 48K		£6.00
THE ULTRA	PSS	£6.40
LIGHT CYCLE	PSS	£6.40
CENTPEDE	PSS	£6.40
THE GAUNTLET	PSS	£6.40
INVADERS	PSS	£6.40
HOPPER	PSS	£6.40
ORICMON	PSS	£7.95
MONTE CARLO RALLY	EXPRESS	£5.50
BRAD RESCUES THE PROFESSOR	EXPRESS	£5.50
SPACE QUEST	EXPRESS	£5.50
BANDIT	EXPRESS	£5.50
GAMESTRIO	EXPRESS	£5.50
FLIGHT	TANSOFT	£4.00
THE HOBBIT	TANSOFT	£13.50
AUTHOR	TANSOFT	£13.00

ALL PRICES INCLUDE VAT & P&P - ALLOW 21 DAYS FOR DELIVERY  
PLEASE SUPPLY

NAME \_\_\_\_\_ TOTAL ENCLOSED £ \_\_\_\_\_

ADDRESS \_\_\_\_\_

SEND ORDERS TO- POSTAL COMPUTER SERVICES,  
FREEPOST P.O. BOX 2, MIDHURST, WEST SUSSEX, GU29 9BR.



# WARY OF COMPUTER BYTES?

READ ON...



Are you missing out on all that your computer can do. These books show you how easy it is to improve your programming. Clear and concise, they will help you make the most of your computer's memory power, for more advanced uses and more exciting graphics.

### YOUR FIRST BASIC PROGRAM

"How-to-Program" book for the first time computer user with colourful illustrations and simple diagrams to help you write your own first program in just one hour.

### PROGRAMMING THE Z80

Instructive text, clear, precise diagrams and easy to follow examples explain everything you need to know about programming using Z80 microprocessors. Important for Sinclair, ZX81, Spectrum and TRS80 Model users.

### PROGRAMMING THE 6502

You need no prior programming knowledge to make use of this detailed book. By applying simple assembly language, you will quickly learn to make your microprocessor perform the way you want it to. Important for BBC users wishing to extend their programming capability, plus Apple, Atari and VIC 20 users.

### THE VIC 20 CONNECTION

Learn the simple techniques for putting your VIC 20 computer to work controlling external devices. Control lights, electricity, burglar alarm system and other non-computer devices in your own home or office.

### THE EASY GUIDE TO YOUR COMMODORE 64

A jargon-free publication that explains the practical operation of your Commodore 64 in word processing, maths, budgeting, filing and more. This friendly guide explains how to use commercially available software, as well as teaching you the basics of programming.



All these books are published by Sybex, renowned for their excellent, helpful publications for computer users and distributed by Computer Bookshops Limited, the UK's specialist computer book and program wholesaler. All are available from good bookshops and computer stores including Lewis's and John Menzies. Request for catalogues: Send SAE to:- Dept. PCN: 4.11.83

**Computer Bookshops Ltd**

30 Lincoln Road, Olton, Birmingham B27 6PA.



John Lettice welcomes a Centronics interface for the Jupiter Ace and Sinclair Spectrum.

# It all ADS up now

Just a few months ago the Sinclair Spectrum and the Jupiter Ace were pretty lonely machines. It was difficult to link them to a wide range of peripherals because of the dearth of interfaces. While there were some interfaces available for the Spectrum, Ace owners must certainly have been feeling aggrieved at the lack of support their machine was getting.

The Spectrum, of course, has had a run of excellent interfacing devices recently, courtesy of Sinclair Research. The launch of the ADS Centronics Interface also means that the Ace, if not coming in from the cold, has at least been thrown a pair of gloves.

The ADS comes in two versions, the straight interface for the Spectrum, which plugs firmly into the edge connector and will drive any Centronics printer, and the slightly more complicated version for the Ace. Here you first fit an adaptor card to your Ace, then connect the interface and your RAMpack to the card.

A tape with the necessary driver software — Spectrum on one side, Ace on the other — comes with the ADS. In the case of the Spectrum, this is a piece of re-locatable

machine code. This means that it can be shifted around in RAM, and will therefore work with all but the fussiest of programs.

However, it is unlikely to work with software that moves RAMtop.

In the event of your having any difficulty with a particular program, clear instructions are given on moving the code's location.

Things proceed just as smoothly with the Ace, although Ace users are much more likely to be using the ADS to take advantage of the ZX Printer, rather than testing the joys of 80 columns. Using the command PRTON will send all output via the interface to the printer, while PRTOFF switches this off. COPY will get you a screen dump.

## In use

It can't be often that a single device can have (apparently) two such widely differing applications. For the Spectrum, the obvious thing to do was to run micro, printer and Tasword 2 as a word processing system, and the three seemed to get on very well together.

Considering the dearth of software for

the Ace, the most likely use for the ADS will be to provide a hard copy output for program listings, and again it does this well. It probably wouldn't make sense to run it with anything more expensive than the ZX printer, unless you already had a larger one, but this set up should provide all the budding Forth programmer is likely to need.

Of course there are hazards with any interfacing project of this kind. The Spectrum's tokenised keywords are a particularly obvious problem. As the letters of the commands are stored as single tokens rather than as separate ASCII codes, just sending them to the printer wouldn't work.

The ADS therefore decodes the tokens and translates them into the ASCII codes that will be understood by the printer. The software assumes that codes above the value of 164 are tokens, but should you need to send data bytes above this value you can.

Using the Spectrum's Basic COPY command also causes problems, so if you wish to use this command you must use a routine (provided on the driver software cassette) which emulates this. You call it by using RANDOMISE USR 23310, which dumps the screen contents to the printer.

The code provided drives a Seikosha GP-250X, but information is provided to allow you to alter it for other graphics printers.

As far as the Ace is concerned, things are rather more DIY. Once you've got over the initial shock of being able to use word processor class printers and graphics plotters, you'll probably start wondering where you're going to get the word processor class software to run with it.

## Verdict

From the point of view of the Ace owner, the ADS interface is undoubtedly a winner. At £34.50 it's a reasonably cheap way to use the ZX Printer to produce hard copy listings, and although it's clearly something of an uphill task, it at least means the hardware for more complicated text and graphics handling is there.

Its position *vis-a-vis* the Spectrum is a little more problematical. Granted, it's a cheap and effective Centronics interface, but with Sinclair Research plunging into interfaces in a big way, Spectrum owners may be thinking more in terms of going RS232 with Interface 1.

That said, there will be Spectrum owners who'll want a Centronics interface, and in terms of efficiency and value for money, the ADS is certainly highly competitive.

**Run ADS Centronics Interface Machine ZX Spectrum and Jupiter Ace Price £34.50 Contact Advanced Digital Systems, 9 Bonchurch Road, Portsmouth, Hants PO4 8RY, tel 0705-823825.**

Photography by Nana





# Your starter for £150.



**This complete starter pack for the price you'd expect to pay for a computer alone.**

It's a complete computer system: the Commodore VIC 20 computer, a cassette unit, a simple explanation of computer programming (called "Introduction to Basic Part 1"), plus an exclusive compilation tape of four computer programs (Blitz, Type-a-Tune, Race, and Hoppit).

And all for just £149.99 or less.

It's a terrific opportunity to introduce yourself, and all your family, to the exciting world of home computers - and with what has been described as the best home computer in the world.

The VIC 20 has educational programs for all ages (spelling, physics, arithmetic, etc.), plus music, typing, chess and home accounts.

There are special programs like Robert Carrier's menu planner and BBC 'Mastermind', and not forgetting, of course, lots and lots of wonderful arcade games.

You'll very soon be exploring new worlds of colour, animation, and sound.

Not just with a vast choice of programs, but with unlimited scope for expansion in the future.

The VIC 20 is the perfect com-

puter to start with because you can keep adding to it, and so get even more enjoyment out of it.

There are printers, disk drives, memory expansion packs and many other peripherals to choose from.

Which means, as your confidence grows, so can your VIC 20.

Get the VIC 20 starter pack today, and we promise you'll never look back.

 **commodore**  
**VIC 20**

YOU CAN SEE THE VIC 20 STARTER PACK AT ALL BRANCHES OF DIXONS AND WALLACE HEATON, AND AT SELECTED BRANCHES OF BOOTS, RUMBELOWS, LASKYS, CURRYS, GREENS, ORBIT, MENZIES, LEWIS'S, MAKRO, TESCO, FINE FARE, WIGFALLS, SPECTRUM, COMET, JOHN LEWIS, WOOLWORTH, REDIFFUSION, CO-OP AND OTHER GOOD RETAILERS. ALSO AT BRANCHES OF A NATIONAL NETWORK OF COMMODORE COMPUTER DEALERS.

## ADVENTURE

## 48K SPECTRUM

Viking  
voyage

Name Valhalla System Spectrum  
48K Price £14.95 Publisher Legend  
Format Cassette Language Machine  
code: Other versions None Outlets  
Some retail, mail order from  
Legend, Freepost, 1 Milton Road,  
Cambridge CB4 1UY.

If you've always fancied yourself as a flaxen haired nordic demigod, but you've found Burton's doesn't stock your size in winged helmets, help is at hand. Valhalla is half epic, half cartoon strip, and its Norse setting is ideal for those with the fjords in their bloodstream.

The graphics screen features a sort of strip cartoon, where the characters actually act out the 'screenplay' seen in the text window below. So, if Thor attacks Loki, you'll see Thor stride across the screen towards Loki, and start beating him about the head with an axe. You'll find you tend to sit back and watch this happen, and the other characters are perfectly capable of carrying on without you, but should you feel inclined to actually do something, there are six quests you can be getting on with.

## Objectives

You have to wend your way through Asgard, Midgard and Hell to pick up a key, a ring, a shield, a sword, an axe and a helmet. In order to do this you'll probably have to pick up a key,

a ring, a sword, etc . . . but you must understand that the quests' objects are actually special versions of the above artefacts.

The quests must be performed in order, and are increasingly difficult. They should easily fill in the odd spots of tedium you run into in those long arctic nights.

## In play

You start off with 200 crowns and your brains. If you want to keep the latter inside your skull it's advisable to get yourself arms and armour fairly sharpish. You can buy these from various other characters, but you can also find them lying around.

You'll also need food and drink, which is there in abundance to start with, but disappears fairly rapidly as you and the rest of the cast munch through it. You can sometimes induce characters to give you things, particularly if the character in question — Thor, for example — suffers from total eclipse of the brain.

Thor in fact found himself on the receiving end of one of my earlier wheezes. First induce Thor to give you the axe, then use the axe to kill an unarmed Thor. I regarded it as a lesson in life for the lad . . .

As far as the condition of your soul is concerned, you start off about half way between good and evil. Your goodness rating changes depending on whether you attack the good characters or the bad characters.

Working on the assumption that being good would probably



mean not being sneaky, I decided to join the blackguards. It might also have had something to do with an encounter I had with arch goodie Odin, who first extracted 50 crowns out of me for a ring he apparently didn't have, then took a ring from one of his henchgoddesses in order to complete the transaction.

Thinking dark thoughts about gods, landlords and pawnbrokers, and feeling practically ruined, I hobbled off in search of a bargain basement sword. Fortunately, shield and helmet were to be found just lying around.

Rings were also to be found in abundance, and I got this recurring vision of Odin sitting behind a large leather-topped desk smoking a fat cigar. However, the 50 crown wonder did serve its purpose well enough.

Rings — except for Drapnir, which is one of the quest objects and about as useful as a lead hula hoop — give you access to Ringways, which act as teleports/bypasses. So in addition to the usual NORTH, SOUTH type commands you can use 'JUMP', which takes you Club Class to the relevant location.

After a bit of hopping around like this, I was well and truly lost. I asked for help, and was told the ringway nearest me led to . . . El Vinos? Surely not *the* El Vinos? Could I get a sandwich there? Would they let my editor buy a drink at the bar? Naturally I had to investigate.

When I finally got out, I'd drunk all the wine and eaten all the food I'd had with me when I arrived, and had had my wallet lightened considerably by one Alvin, billed in the manual as a dwarf, but clearly some kind of profiteer.

I won't tell you about my other attempts at the game, about my attempt to lock away all the food and wine in the universe and sell it to the other characters for huge sums, or about my attempt to sell an axe to a wolf.

Nor will I tell you how you finally solve the quest — matter of fact, I'd be grateful if you'd tell me. What I will tell you is that Valhalla is well worth the rather substantial cost.

## Verdict

I have very little that even approaches a complaint about Valhalla. The graphics are good and varied, and although the responses can be slow, this is because the machine is processing the moves for a number of characters, not just you.

Even this minor problem is dealt with by the way the program allows you to stack instructions. For example, you can type in get food, eat food, go north in quick succession, then see your character do all these. It's a good idea to do this, as it lets you get the drop on other characters.

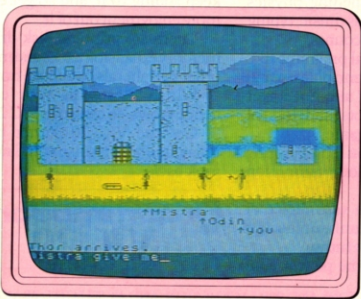
Another departure from the traditional format is the way the manual is actually designed to help you win. You get a detailed guide to the characters, a couple of clues, and a list of common words and their accepted syntax.

This means you'll get into it straight away, so it's less frustrating than most games, although no less difficult.

John Lettice

## RATING

Lasting appeal	★★★★★
Playability	★★★★★
Use of machine	★★★★★
Overall value	★★★★★



# THE FABULOUS CASSETTE

# 50

FROM **cascade**

50 GAMES ON ONE GREAT CASSETTE

**ONLY  
£9.95**

DON'T MISS THIS  
INCREDIBLE OFFER

**50** FANTASTIC  
GAMES ON  
ONE CASSETTE

**ONLY £9.95** (INC. P.L.P. AND VAT)



## EXPRESS DELIVERY - ORDER NOW

Please send me by return of post, Cassette 50 at £9.95 per tape. I enclose a cheque/postal order for  £

Name

Address

Post Code

Country

*Dealers & Stockists enquiries welcome.*

Please send me (tick appropriate box)

Spectrum  VIC



Cascade Games,  
Suite 4, 1-3 Haywra Crescent,  
Harrogate, N. Yorkshire, HG1 5BG,  
England.  
Telephone: (0423) 504526

PCN 3/11/83

# Do you suffer from PCNitus?

Thousands do! So, specially for all you sufferers who want to keep PCN immaculate, easily accessible and out of reach of grubby hands, we've designed this attractive PCN binder.

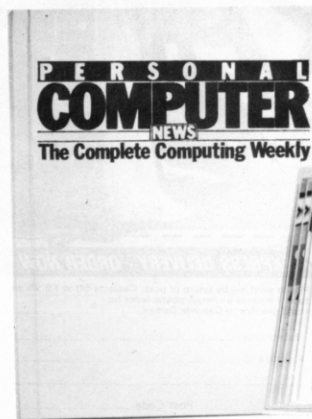
It's red, yellow and silver and will hold four month's copies.

No more grappling in the back of cupboards; no more bent and creased pages!

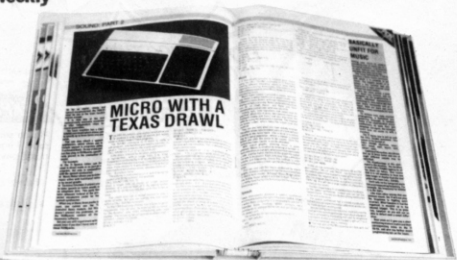
Your copies lie completely flat,

even when the binder is full. You'll be able to read them easily and refer to them quickly. And we'll post the binder to you in a batter-proof package at no extra cost.

It's an attractive price, too. Only £3.50, including postage, VAT and handling. Use the coupon here or, to avoid defacing your copy of PCN, write out your order clearly and send it with payment to the address given.



**ONLY  
£3.50**



BINDER ORDER CARD. Please rush me \_\_\_\_\_ PCN binder(s) at £3.50 each. I enclosed my cheque made payable to Personal Computer News. Please charge my Access/Visa/Diners/American Express card (delete where not applicable)

Account No. .... Name .....

Address ..... Town ..... Postal code .....

..... Signed .....

Send to Personal Computer News, Binders Department, 53/55 Frith Street, London W1A 2HG

# MicroCare

## microcomputer repair service

# THIS CHRISTMAS BUY SOMEONE A YEAR'S PEACE OF MIND...



Offer a MicroCare warranty with its distinctive, specially designed presentation cover. A super gift for any computer owner! Warranties for most of the popular computers are available, at prices which are very low for what they give. A year's peace of mind.

The sooner you buy a warranty, the cheaper it could be. Look at the table to determine for how little you can place MicroCare's expertise at someone's disposal this Christmas, giving them A year's peace of mind.

Consider some of the advantages of a MicroCare warranty:-

1. You may send your computer in for repair as often as necessary during the warranty period.
  2. Your computer receives expert attention and care.
  3. After repair it is thoroughly tested and promptly as possible.
  4. The small print on the warranty states that MicroCare's liability extends to the repair of electronic faults, or replacement of the computer if found to be irreparable.
- What more could you want? Buy someone a year's peace of mind. We have the experience it takes. We have the parts on hand. So act now, keep someone's computer "humming"

ONE-OFF REPAIR SERVICE

Model	SCHEME B Cost of 12 months warranty if more than 90 days old		SCHEME C Cost of 12 months warranty if manufacturer's guarantee has expired.	
	SCHEME A Cost of 12 month warranty if less than 90 days old			
Atari 400	£14.90	£21.90	£29.90	£25.90
Atari 800	£14.90	£21.90	£29.90	£25.90
BBC A	£14.90	£21.90	£29.90	£25.90
BBC B	£14.90	£21.90	£29.90	£25.90
Commodore Vic 20	£14.90	£21.90	£29.90	£25.90
Commodore C 64	£12.90	£18.90	£25.90	£22.50
Dragon	£14.90	£21.90	£29.90	£25.90
Acorn Electron	£12.90	£18.90	£25.90	£22.90
Oric	£12.90	£18.90	£25.90	£22.90
Comyx	£12.90	£18.90	£25.90	£22.90
Lynx	£ 9.50	£13.90	£19.90	£15.50
Spectrum	£12.90	£18.90	£25.90	£22.50
ZX81	£12.90	£18.90	£25.90	£22.50
Sirius	£12.90	£18.90	£25.90	£22.50
Jupiter Ace	£12.90	£18.90	£25.90	£22.50
Texas T199/4a	£12.90	£18.90	£25.90	£22.50

7-9 Thane Works, Thane Villas, London N7 7PH Tel: 01 609 7919

# MicroCare

Please send me \_\_\_\_\_ warranty/warranties for scheme/s \_\_\_\_\_ serial number/s \_\_\_\_\_  
 for computer/s model/s \_\_\_\_\_ made out to MicroCare, or I would like to pay by Access or Barclay Card  
 I enclose cheque for \_\_\_\_\_  
 and I enter my number and signature accordingly. \_\_\_\_\_ Occupation \_\_\_\_\_  
 Name \_\_\_\_\_ Date \_\_\_\_\_  
 Address \_\_\_\_\_  
 Signature \_\_\_\_\_

Please note that if you are applying for warranty under scheme A or B, please enclose the original manufacturer's warranty. It will be returned with your Microcare warranty.



Peter Worlock battles enemies alien, avian and electromagnetic on the colourful Commodore.

# Six-pack for the 64

It is only a few short weeks since Commodore 64 owners were facing a dire shortage of software for their micros. Now the opposite is the case; some excellent games are being shipped in from the US while the British software houses have finally cranked up their programmers and are now merrily churning out cassettes.

PCN had a look at half a dozen of the recent releases.

## SUPER DOGFIGHT

To start off on a high note, a classic in more than one sense.

This was one of the very first arcade games and Terminal Software has produced a marvellous implementation.

It's also something of a rarity in that it is for two players. Each controls a World War I biplane in a dogfight to the death. Control is by joystick only.

At the start you look down on a blue sky ringed by a clever graphic impression of billowing white clouds. The two combatants appear flying side by side before wheeling away to start the game.

The screen features full wrap-round so it quickly becomes a tactical contest to get on your opponent's tail, or make a swooping attack out of the cloud.

The planes themselves are neat little sprites with a simple 3D effect that gives a sense of perspective as they loop and dive around. The sound effects are excellent.

The only minor criticisms of Super Dogfight are that you need two joysticks and two people. Terminal could have produced a game with a wider appeal had there been the option of using the keyboard and playing against the computer.

Still, provided you have the joysticks and a playing partner, this is highly recommended.

## VULTURES

Unfortunately, I can't lavish such praise on this one from J Morrison Mic-



ros. But there are no real grounds on which to criticise the game. The graphics are splendid multicolour sprites with very smooth animation and good sound effects.

So what's the problem? Simply that it is all such old hat now. It's been said before in PCN Gameplay and merits a repeat: there really is little point in games writers turning out variations on Pacman and Space Invaders *et al.*

Vultures falls into the category of pale imitation. It's fun and fast and colourful but most people will already have something similar. If you don't then here's what you get: you play a humanoid at the foot of the screen, shooting down laser-spitting vultures descending from the top.

If you clear the sheet two eggs hatch open and three faster, more vicious birds appear. If they don't shoot you first they may pick you up and carry you aloft to an unspeakable end. Shooting them down merely moves you to a faster level.

Not very original, not very addictive.

## KONG

No prizes for guessing the plot of this one, another copy of the arcade original. This, from Anirog, is the second version I've seen for the 64 and though a closer copy of the original, loses something in playability.

There are only three floors of girders (I seem to recall the

arcade version having four) but everything else will be familiar. Kong even throws the barrels, instead of them magically appearing from off screen somewhere.

Again, the graphics are well done but given the graphics facilities on the 64, there can be no excuse for boring displays or jerky animation.

One common fault with 64 sprites is that collision detection can be tricky to handle and this seems to be a fault here. The upshot is that timing your jumps is even more crucial than arcade addicts will be used to. However, if you want a version of Kong, you could do worse.

## BITMANIA

The lowpoint of this round-up, Virgin Games' usual high standard of packaging credits one Kieron Brennan with the creation of Bitmania. He is, apparently, 16 years old and prefers games that are 'fast, colourful and visually exciting'.

Bitmania fulfills these conditions but fails in one department: it's a boring game to play.

Master Brennan is a wizard in the graphics department and this game is one of the most beautiful I have seen. The title screen is colourful with a clever script display. The game itself features user-defined graphics, swooshing sprites and a multitude of shapes whizzing about in all directions.

Sadly, it is marred by a lack of balance. If half the effort invested in the graphics depart-

ment had been spent on improving the actual playability of the game, it would have been a masterpiece.

After the first moments of blind panic in the face of the screen pyrotechnics, it becomes apparent that you can position your gun in one of several relatively safe spots and, with only a few corrections, knock out the enemy with impunity.

The scenario is also a little bizarre. You are apparently in the data bus of the 64 attempting to reach the 'central core'. You do this by blasting the bits dispatched against you by the CPU.

By far the best thing about Bitmania is the introduction sequence. If, instead of going straight into the action, you wait a bit, you will be rewarded by a superb piece of musical programming that sounds very much like Vivaldi. I quickly gave up playing and left this musical accompaniment running for a while.

## MOON BUGGY

Another one from Anirog and much the better of the two. You control the vehicle of the title, speeding across the lunar terrain facing a multitude of perils from an enemy attack force.

There are many ways to lose here, zapped from above, blasted from the front, driving over a mine or simply crashing in a crater. You have forward and vertical lasers to defend yourself and control over the

## GAMEPLAY

speed of your buggy. By accelerating and jumping you can avoid the mines and craters but it really is a test of hand-eye coordination.

The graphics are simple but cutely effective. Your buggy has independent six-wheel suspension as you move across the rough surface and when you lose a life the tyres pop off in a manner guaranteed to raise a smile.

## SUPER COPTER

Helicopters do seem to be in on the 64 this season. Following hot on the rotor blades of Choplifter and FORT Apocalypse comes this title from newcomer Mondatta.

I felt the adrenalin surge as I read the inlay; it sounds like a combination of 3D arcade action and flight simulator. And so it is, but a little disappointing in the implementation.

You have two screen displays in the first section, starting with the view from the cockpit. Displays include speed, RPM, pitch, fuel and other necessities of flight control. You can switch to radar which gives you a pictorial image of the playfield and shows your position, barrage balloons, ground to air missiles and your target — the enemy island.

The hazards in this first section include 4,000ft high mountains which you must fly over or round, and a radar screen at 1,500 feet which you must fly under.

Having reached the island in less than 5mins 30secs, you can refuel and set about blowing things up. Unfortunately I was never able to get to this exciting bit, being in the habit of hitting mountains, lasers or missiles, or avoiding these and running out of time.

The graphics are adequate, the sound is disappointing and, so far as I was able to tell, there's little excitement. However, it does make a change from the Invaders/Pac-man clones.

**Moon Buggy, Kong** (£7.95), Anirog, 8 High Street, Horley, Surrey.  
**Vultures** (£6.95), J. Morrison  
 Micros, 2 Gleasdale Street, Leeds.  
**Super Dogfight** (£9.95), Terminal Software, 28 Church Lane, Prestwich, Manchester.  
**Bitmania** (£6.95), Virgin Games, 61-63 Portobello Road, London W11.

**Super Copter** (£5.65), Mondatta Ltd, 38 Cuddington Avenue, Worcester Park, Surrey.

# Which home computer gives you so much software for so little?

### Entertainment for all:

Video Chess	£34.95
Munchman	£29.95
Parsec (Optional Speech)	£29.95
Othello	£24.95
Tunnels of Doom	£24.95
Adventure Cartridge	£24.95

Additional Adventure Games:  
all at £14.95

Adventure Land	
Mission Impossible	
Voodoo Castle	
The Count	
Strange Odyssey	
Mystery Fun House	
Pyramid of Doom	
Ghost Town	
Savage Island	
Golden Voyage	

Alpiner	
(Optional Speech)	£24.95
TI Invaders	£19.95
Car Wars	£19.95
Chisholm Trail	£19.95
Hustle	£14.95
Tombstone City	£14.95
Connect Four	£14.95
Video Games 1	£14.95
Hunt The Wumpus	£14.95
Five-A-Side Soccer	£14.95
Amazing	£14.95
Attack	£14.95
Blasto	£11.95
Blackjack & Poker	£11.95
Zero Zap	£11.95
Yahtzee	£11.95
Oldies But Goodies 1	£11.95
Oldies But Goodies 2	£11.95
Market Simulation	£11.95

### Educational:

Early Reading	£29.95
---------------	--------

Music Maker	£29.95	Graphing Package	£29.95
Alligator Mix	£24.95	Structural Engineering	
Alien Addition	£24.95	Library	£29.95
Demolition Division	£24.95	Programming Aids 2	£19.95
Dragon Mix	£24.95	Programming Aids 3	£19.95
Minus Mission	£24.95	Speech Editor	£19.95
Meteor Multiplication	£24.95	Programming Aids 1	£11.95
Touch Typing Tutor	£24.95		
Addition Subtraction 1	£19.95	<b>Programming Languages:</b>	
Addition Subtraction 2	£19.95	PASCAL Editor	£99.95
Multiplication	£19.95	PASCAL Linker	£79.95
Division	£19.95	Extended BASIC	£69.95
Numeration 1	£19.95	TI Logo	£69.95
Numeration 2	£19.95	Editor/Assembler	£69.95
Early Learning Fun	£14.95	Mini Memory	£69.95
Beginning Grammar	£14.95	PASCAL Compiler	£59.95
Number Magic	£14.95		
Hangman	£11.95	<b>A.S.K. Applied Systems</b>	
Teach Yourself Extended		<b>Knowledge:</b>	
BASIC	£11.95	Hide and Seek	t.b.a.
Beginners BASIC Tutor	£9.95	Number Gulper	t.b.a.

### Home Organisation:

Personal Record Keeping	£39.95	<b>Collins-Educational:</b>	
Personal Report		TI-99/4A Starter Pack 1	£9.95
Generator	£39.95	TI-99/4A Starter Pack 2	£9.95
Home Budget	£24.95	TI-99/4A Game Writer	
Home Financial		Pack 1	£9.95
Decisions	£24.95	TI-99/4A Game Writer	
Personal Financial Aids	£11.95	Pack 2	£9.95
		Chess Learner Pack	£9.95
		Record Keeper Pack	£9.95

### Other Applications:

Inventory	£85.95	<b>Ivan Berg Software:</b>	
Invoicing	£85.95	Maths Tester 1	£9.95
Mailing List	£85.95	Maths Tester 2	£9.95
TI Writer		Physics Tester	£9.95
(Word Processing)	£85.95	Chemistry Tester	£9.95
Multiplan (Spread		Biology Tester	£9.95
Sheet Program)	£85.95	Human Biology Tester	£9.95
Statistics	£54.95		
Terminal Emulator	£49.95	<b>Bond Associates:</b>	
Maths Routine Library	£29.95	Easycalc	£49.95
Electrical Engineering			
Library	£29.95	<b>Little Genius Ltd:</b>	
		Scrabble	£29.95

## And is available at all these dealers?

### All branches of:

Argos, Corner, Dixons, Greens of Debenhams, John Lewis, Kumbelows, Wigfals, Zappo.

### Major branches of:

Asda, Binns, Computers for All, CO-OP, Currys, Fine Fare, Ketts, Photomarket, Rymans, Spectrum, Telefusion.

### And at:

ABC Computers - Str Austell  
 Akhter - Harlow  
 Anglia Audio - Bedford  
 Anglia Sound - Stevenage  
 Audio Marketing - London  
 Audio Vision - Faversham  
 Bagnall - Stafford

Carvels - Rugby  
 Combined Trading - Hatfield  
 Computer Supermarket -  
 Manchester  
 Cotton TV - Peterborough  
 Dean and Son - London  
 Delta Electronics - London  
 Densham Computers - Poole  
 Desk Aids - Southampton  
 Dodar - Ashton  
 Fenwicks - Newcastle  
 Galaxy Video - Maidstone  
 Hamleys - London  
 Harrods - London  
 Heffers - Cambridge  
 Hyman Computers - Manchester  
 Landau - Sutton  
 Lion House - London

Micro Value - Amersham, Bucks.  
 Midshires - Crewe  
 Milequip - Gloucester  
 OEM Computers - Rugby  
 Parco Electronics - Honiton  
 REW - London  
 Robox - Glasgow  
 Science Studio - Oxford  
 Selfridges - London  
 Star Trek Video - Wigan  
 Toy and Hobby - Wigan  
 Universal Warehouse - Reading  
 Video Palace - London  
 Vision Store - Kingston  
 Welwyn Dept. Store -  
 Welwyn  
 And many other leading  
 Computer Stores.

## Turn the page and see the unbeatable.


NEW  
LOW PRICE  
**£109.95**  
OR LESS



TEXAS INSTRUMENTS  
HOME COMPUTER  
SOFTWARE BOXES

TEXAS INSTRUMENTS  
HOME COMPUTER  
SOFTWARE BOXES





# The unbeatable TI Home Computer. It's all the computers your family will ever need.

Buying a home computer is something you have to get right first time. It's too late when you've got one to find it won't take plug-in software. Or can't be programmed without an expensive accessory.

## The TI Home Computer is a real computer system

The TI Home Computer has got the memory power you might expect from more expensive computers, built in. At its heart is a powerful TMS 9900 16-BIT Microprocessor. Most other home computers have only an 8-BIT. And you can expand the memory from 16K of RAM up to 52K.

The total memory capacity is 114K Bytes.

## A wide range of software for everyone

Another feature that makes the TI system so powerful, yet so easy to use is Solid State Software™. These plug-in cartridges cover everything from space games like Parsec™ to teaching maths, managing home finances and composing music. And the range is getting wider all the time.

## It even has what professionals look for in a home computer

**CPU:** TMS 9900 16-BIT, plus 256-byte Scratchpad RAM.

**Memory:** Total 114K bytes; 26K bytes ROM internal; up to 36K ROM cartridges external; 16K built-in RAM expandable to 52K bytes.

**Keyboard:** 48 Key QWERTY, alpha lock, function key auto repeat.

**Sound:** 5 octaves, 3 simultaneous tones, noise tone.

**Colour:** 16 foreground and background. High resolution.

**Interfaces:** Cassette, TV, 2 joysticks, main peripheral port.

™ trademark of Texas Instruments.

## More than one programming language

The standard programming language, TI BASIC, is built into your TI Home Computer so you can begin programming right away. But there's an expanded range of optional languages like Extended BASIC, TI Logo, USCD-Pascal, TIFORTH and Assembler.

With these you can fully expand your programming skills.

## A wide range of peripherals

Most computers lose a lot of memory when you add peripherals. The TI Home Computer is different. Every peripheral comes with its own built-in programs to keep the loss of memory to a minimum.

The convenient Peripheral Expansion System houses up to eight peripherals. Additional hardware cards simply plug in. You can even add a complete Floppy Disk Memory System.

The peripherals include memory expansion, RS232 Interface, P-Code card and more. There's also a sophisticated matrix printer and Solid State Speech™ synthesizer—which you can use with your own TIBASIC programs.

## A lot more for no more

The TI Home Computer gives you so much more without costing more.

At today's price it's exceptional value. Take your family round to try one. If you never try it you'll never know what you're missing.



# TEXAS INSTRUMENTS

Creating useful products  
and services for you.

# CUBIC CAPERS

## ATARI 400/800

### Spring to action

**Name** Slinky System **Atari** 400/800  
**Price** £14.95 **Publisher** Cosmi  
**Format** Cassette **Other Versions** Vic-20, TT 99/4 **Outlet** Home Computers, 234 Church St, Blackpool FY1 3PX Tel 0253 22340.

If you've ever owned one of those spring-like toys known as a Slinky, then the hero in this game should be familiar to you. Similarly, if you're an arcade fan, the game itself will not be unknown.

#### Objectives

Controlling Slinky, you must bounce around a Pyramid of cubes, turning each one to the same colour as you go. You start with 25,000 points and lose points with each move — the aim is to lose as few as possible. Several objects help or hinder your progress — a magnet, raindrop, dustcloud, face and chameleon. These can drop you off the edge, speed you up, slow you down, wipe you out or just generally get in the way. Hyperspace holes and bonus blocks add to the complications, as do the 99 different levels of play.

#### In play

Slinky, a golden spring, is perched on the top left of a pile of 52 three-dimensional white cubes. He can only hop diagonally and moving the joystick in

the wrong direction when he's near the edge has Slinky springing to his doom. On the first level, Slinky merely has to land on each hexagon, turning it to blue. If he leaps down a black hyperspace block, he ends back up at top left.

All the hazards have names, a feature that is probably right for the youngest players but a trifle treacley for older hands. Do Marge the magnet and Ralph the raindrop make you smile or grimace? Marge has a nasty habit of flying along a row at irregular times and if there, Slinky will be picked up and dropped off the edge. On the other hand Slinky might be lucky and drop down a hyperspace hole.

Slinky turns blue when hit by Ralph and moves at double speed. If hit by Dusty the dustcloud, Slinky turns brown and loses more points per move. If struck by Ralph and Dusty, he rusts and Oil-Can Charlie rushes on to cart him off for scrap metal to the tune of Raindrops Keep Fallin' On My Head!

#### Verdict

Highly addictive, much more so than the original arcade version. The colourful graphics, particularly Slinky itself are excellent. Despite the twee names, this is a first class game of skill and strategy for all ages.

**Bob Chappell**

#### RATING

**Lasting** 

**Playability** 

**Use of machine** 

**Overall value** 



## COMMODORE 64

### Bert likes bounce

**Name** Hexpert System **Commodore** 64 **Price** £7.95 **Publisher** Anirog Software, 8 High St, Horley, Surrey **Format** Cassette **Other versions** None **Outlet** Mail order & retailers.

Another arcade original comes to the personal computer. Bert, forsaking his old heap of hexagons, has taken up residence on a new pile of blocks. Although he can now be found bouncing around on the Commodore 64, he still hasn't shaken off his pursuers.

#### Objectives

An odd, furry creature, Bert has been abducted by Zoga-naar, a wicked witch and forced to play on her fiendish Pyramid of hexagons. Bert must leap from block to block, avoiding two massive rubber balls which are bouncing around after him. Not only that, the witch's pet snake Coily, has also decided to yomp round the Pyramid.

Bert must change the colour of every hexagon by jumping on each one. If he is touched by a ball or the snake, he loses one of his five lives. If he inadvertently leaps off the edge, bye bye Bert for good.

Bert has some help. He can jump on one of two spinning disks which will transport him to the top of the pyramids.

#### In play

No introductory music, just a simple title page with the title slowly moving from the bottom to the top of the screen. You

can't start until it reaches the top. Unfortunately, this pause occurs every time you start a new game and slows down the pace. The pyramid of 21 three-dimensional blue hexagons appears, with a chocolate-coloured spinning disk on both sides.

A spinning barrel descends from on high, depositing Bert part way down the pyramid. The game is afoot, and that's quite an apt phrase since Bert needs to be very fleet of foot.

He's hardly started leaping when two giant Maltasers start bouncing down the pyramid, immediately followed by the coiled snake. If he's leapt upon, Bert loses a life. Fair enough. What's not quite so sporting is that if, in leaping, he just touches any of these creatures in passing, he still loses a life. Even worse, if he should jump off the pyramid altogether, he loses all his lives and that makes it a bit frustrating. If Bert can turn all the hexagons yellow by landing on them, he gains bonus points and has to start again, with the action faster.

Sound effects are minimal. The graphics are pleasant if lacking in animation. However, I was impressed by the bounce of the rubber balls, and the 3-D effect is a saving grace.

#### Verdict

The graphics and sound could have been livelier and there's not enough variety to hold the attention for long. Nevertheless, it is a challenging little game and worth a spin.

**Bob Chappell**

#### RATING

**Lasting appeal** 

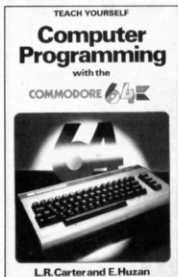
**Playability** 

**Use of machine** 

**Value for money** 



Which book would your micro want you to buy? PCN's review page helps you choose.



**Teach Yourself Computer Programming with the Commodore 64**, by L.R. Carter and E. Huzan, published by Hodder & Stoughton at £2.75 (paperback, 206 pages).

Anyone familiar with the Teach Yourself range of titles will know what to expect from this offering: well thought out, professionally produced, clearly presented. If there is a criticism it can only be that it is rather dry stuff.

However, perseverance has its own rewards and this is a book well worth studying. Beginning with a straightforward, no-nonsense guide to computers, it works its way through the by now well tried and tested route of input/output routines, program development, branches, and the other unexciting but necessary prerequisites to getting your micro to do what you want.

Then follows what many will find the more interesting and exciting section on graphics and sprites, sound and bigger applications.

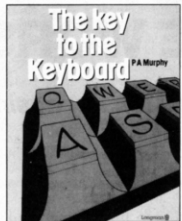
All of this is thoughtfully illustrated with diagrams, flowcharts, printouts and program listings.

It is perhaps the choice of program examples that gives the book its serious feel. There are no frivolous (or particularly exciting) examples and a look at the list reveals all: a program to calculate linear regression, a mortgage calculator, one to calculate the roots of quadratic equations. However, it must be said that the selection admirably illustrates the points under discussion.

If all this sounds off-putting to those of you with dreams of inter-galactic, multi-coloured megadeath on your 64, the

book will fulfil the promise of its title: it will teach you to program your 64.

Indeed, of the many books that have appeared for this machine, this is undoubtedly the best I have seen if you really want to learn to program and are not just toying with a powerful micro. **PW**



**'The Key to the Keyboard'** by P.A. Murphy, published by Longman at £2.95 (paperback, 64 pages).

Even though you can talk computer-speak, beat the aliens and keep your home accounts on line, chances are you are still a two-fingered typist. And what makes that tedious is you still have to look at the keyboard rather than at the screen.

With this teach-yourself paperback Murphy aims to train you through the typing barrier, even if you've never touched the keys before.

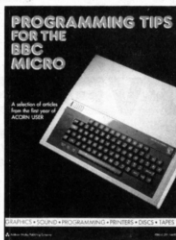
Clear, well-presented instructions take you easily through the course, starting with an explanation of how to position your hands over the board and finishing with copying exercises. There are plenty of diagrams, revision tests and practice routines, allowing you to master the keys at your own speed.

Though designed more for the typewriter user, this would do equally well for qwerty keyboard tappers. **NR**

**'Programming Tips for the BBC Micro'** (Acorn User Annual), published by Addison-Wesley at £6.95 (paperback, 143 pages).

Here's a good book that does what it claims to do. On the cover we're told it contains articles on 'graphics, sound, programming, printers, disks, tapes' and it does, in considerable detail.

This Acorn User annual is designed as a series of articles



which go from the various fixes needed for the OS0.1 operating system, to the BBC DFS and how printers work. They look the same as they did when published in the magazine and include programs.

With all this the book is a must if you've just bought a BBC Micro and want to know what it can do and how to do it. In the programming section, there are hints and tips on speeding up programs, garbage collection and various procedures and functions.

The next chapter is on graphics, and includes articles on moving pictures, colours, and how to install a light-pen and how it works.

There's a chapter on sound with sections on the sound and envelope commands, finishing with programs on how to compose with the BBC. An excellent chapter on the disk system follows this and the book concludes with a section on tapes and multiple programs, and a game.

All in all this is an excellent book and useful for reference. **KG**

**'Outstanding Programs for your Apple'** by Michael Orphanides, published by Interface Publications at £5.95 (paperback, 181 pages).

The title of this book fills you with great expectations which for me at least were not fulfilled.

After a brief foreword, the first chapter plunges straight into the first program. Each program has an introduction covering about a page. There are brief explanations of the program structure for the early programs, but as the book progresses less information is given.

The book is divided into sections on utility programs,

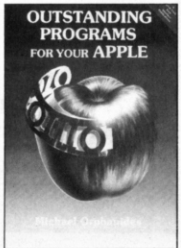
graphics, games, general education, language skills and number skills. The utility programs are quite straightforward but also rather limited. For example, the Bank Account program only records debits and credits without a facility to add comments on each transaction.

The graphics programs enable you to draw pictures of the space shuttle or a Lamborghini sports car in a variety of colours, in a similar fashion to the sample program given on the Apple system master disk. The space plotter is the longest and probably one of the few outstanding programs. This uses equations to draw straight lines, circles, hyperbolas and exponential graphs.

The games section contains the predictable version of blackjack plus two other gambling games as well as a version of Mastermind called Applemind. An up-to-date wargame entitled Attack from the USSR, complete with SS20 missiles, brings the film *Wargames* to your own computer. Vell is the name of the space program in which you have discovered a new planet and, just like the intrepid colonist of the past, proceed to annihilate the natives one by one so that it is safe for humans to live there.

The educational programs teach useful things like the capitals of the world, famous people, geometry and mental arithmetic. Of course, you have to know all the answers to program the computer. The final program is that old University computer programming course favourite, the roots of a quadratic equation.

I would not call the programs in this book outstanding; some of them are good, but others are only fair. **MB**



# MICRO ANSWERS

## YOU'VE READ WHO'S BEST VISIT THE WORST

*Come and see how we run our business*

### ● Overstocked

Ten micros, over one thousand software titles and a wide range of books, magazines and peripherals.

### ● Excessive Service

All main micros on permanent demonstration and any purchase will be gladly demonstrated before sale.

### ● Overstaffed

Laurie, Steve, Nadeem and John, who all own and use their own micros.

### ● Too easily accessible location

Only two minutes walk from Victoria Station, which is covered by mainline and underground trains and over 20 inner London bus routes.

**NOW OPEN**

# MICRO ANSWERS

70-71 WILTON ROAD LONDON SW1V 1DE

Telephone: 01-630 5995

TWO MINUTES FROM VICTORIA STATION  
OPEN MONDAY-FRIDAY 10AM-8.30PM  
SATURDAY 10AM-7PM



# PCN ProgramCards

ProgramCards are a handy way of collecting software. Each card of the listing contains a set of comments which tell you how the program works as you type it in. If you wish to convert the program to run on another machine, these comments are invaluable. So, hopefully, our offerings will find a wider audience.

Two educational programs, this week, one for the Spectrum (48K) and one for the Oric-1.

The program for the Oric, from Mrs D Ross, is an educational puzzle called multisquare. You are presented with a nine by nine grid, printed on the screen. Multiplication questions are then asked, with a question mark placed in the square where the solution would be. If the answer, entered, is correct, then the solution replaces the question mark. If the answer is wrong, then an asterisk is placed there and the question is asked again, at a later date in the puzzle.

The use of a matrix is very good for representing the relationship between

numbers and their multiples. The matrix can also be used to glean clues as to what the answers are.

Multisquare is quite a simple program and quiz, but it does have the advantage of being short and easy to type in.

A more advanced educational program is the mini-math program from A J Moran, of Chorleton, in Manchester. This program, for the Spectrum, can be used by either one or a number of people, as the numbers displayed on the screen are exceptionally large. The test consists of the four main arithmetical operations, add, subtract, divide and multiply. The addition and subtraction tests can be solved by mental arithmetic, but the multiplication and division tests tend to be a little on the difficult side and may need the help of a piece of paper.

Two levels of test are offered. The easy levels are not too difficult, but the hard ones get a bit nasty, especially the multiplication tests.

On-screen instructions are provided,

but by typing 'STOP' during any of the tests, you can get back to the menu, you are not allowed to stop until you have scored something. Note that the teacher and Fool on the Hill routines can be missed out as required, as can the tunes which are played at the end of each section if you get more than 50 percent.

We pay for published programs according to complexity, originality and the programming skill demonstrated. So why not give us a RUN for our money?

As well as the cash, you receive the satisfaction of seeing your byline on the ProgramCard — which will, of course, be snipped out and filed away in the libraries of thousands of micro enthusiasts.

Send your contribution, on disk or cassette, together with a plain paper listing and brief summary notes to: *The Programs Editor, Personal Computer News, VNU, 62 Oxford Street, London W1A 2HG.*

All disks and cassettes will be returned as soon as possible after evaluation or publication, at our expense.

## PCN ProgramCards

### Mini Math

### Card 1 of 10

8335MM 1/10

### ZX Spectrum Spectrum Basic

Author: A J Moran

Application: Education

```

ET 1 LET array$=0: LET x=0: L 55 PRINT INK 6; AT d+1,12: " G
   rogue=0: LET for1=0 H 60 PRINT INK 6; AT d+2,12: " A
   LET sc=0: LET count=0 B 65 PRINT INK 6; AT d+3,12: " C
   LET tcount=0: LET tsc=0 C 70 PRINT INK 6; AT d+4,12: " G
   BORDER 0: PAPER 0: INK 7: C D 75 PRINT INK 1; AT d+5,12: " EF
LS 10 RESTORE 9000: FOR f=144 TO 70 PRINT INK 6; AT d+4,12: " G
157: FOR n=0 TO 7: READ a: POKE H 75 PRINT INK 1; AT d+5,12: " EF
USR CHR$(7+n,a): NEXT n: NEXT f 80 PRINT INK 1; AT d+6,12: " EF
11 FOR a=1 TO 50: LET w=INT IP 85 PRINT INK 1; AT d+7,12: " EF
ND 0.55): LET r=INT (RAND*100): PL 90 PRINT INK 1; AT d+8,12: " EF
OT 0.55,40+r: NEXT a: PLOT 0,0: DRA 95 PRINT INK 2; AT d+9,12: " IJY
14 IF rogue=1 THEN GO TO 30 100 IF rogue<>0 THEN GO TO 140
15 LET d=-10: LET a=20: LET li 101 PRINT INK 2; AT d+10,12: " ML
16 IF d=0 THEN GO TO 190 105 IF rogue<>0 THEN GO TO 150
17 BEEP .1,a-1: LET line=line- 105 BEEP .1,a: PRINT INK 2; AT d
   10 IF d=0 THEN GO TO line+3 110 IF rogue=0 THEN GO TO 50
   10 IF rogue=0 THEN GO TO 50 111 LET d=50: LET a=-10
   11 LET d=50 112 PRINT INK 1; AT d,12: " EF
   12 IF d<0 THEN GO TO line+9 115 IF rogue<>0 THEN GO TO 150
   13 PRINT INK 1; AT d,12: " EF +10,12: " MNHNMN "
; AT d-1,12: "

```

1-3 Initialise variables  
5 Select the screen colours  
10 User defined graphics for the rocket routine  
11 Print the stars and the horizon  
14-20 Land rocket

50-164

Draw rocket using UDG's and move it up or down depending upon the value of rogue

# Fly the Learning Curve with **condor** database see costs take a dive.

Get your database up and running fast with Condor the integrated system you can upgrade when you need increased manipulative power - IBM PC and Sirius versions immediately available.

Condor is compatible with all micros with CP/M, MSDOS, CP/M-86 MP/M, PCDOS.

**FAST TO IMPLEMENT EASY TO CHANGE SIMPLE TO USE**

## LEVEL I

Single Files  
Simple Reports  
Computations  
Full Screen Formatting  
now only **£95**

## LEVEL II

Multiple Files  
Relate Datasets  
Statistics  
Change Datasets

**£195**

## LEVEL III

Fully Relational  
Database Manager  
Indexing  
Report Generator

**£295**

**REVISED PRICES  
LIMITED PERIOD ONLY**

**REGISTERED USERS UPGRADE TO NEXT LEVEL £125**

Selected Software from **M.O.M. SYSTEMS LTD:**

21 Bon Accord Street Aberdeen  
Tel: 0224 571825 Telex: 739740



**M.O.M.**

**the information engineers**

# SPOT THE DIFFERENCE!

Choosing which game to buy from the mountain available is a difficult job, especially when everyone claims to produce the best on the market. But how can you tell the best from the rest? To help you decide, read on. . . .



## THE DUNGEON MASTER

Let your Spectrum be your guide in a totally new dimension in adventures in the true spirit of traditional role playing games where YOU design the scenario.

"I have been a Dungeons and Dragons fan for several years...The package provides excellent entertainment for all fans of the cults and should prove a good introduction to the game".

—Sinclair User.

"Highly recommended for its versatility, originality and quality. Definitely well worth obtaining".

—ZX Computing.

ZX Spectrum 48K £7.50  
Written by Graham Stafford.

### What the real critics say. . .

Very rarely have software titles produced such universal acclaim as 'Halls of the Things' and 'The Dungeon Master'. Now, with three brand new programs, Crystal continues to set the standard of software excellence. The difference is obvious - the choice is yours:

**The Best or The Rest.**



## HALLS OF THE THINGS

A stunning multi-level maze 'arcade - adventure'.

"Excellent and dangerously addictive - could change the Spectrum games scene overnight".

—Sinclair User.

"Spectacular - One of the best games I've seen, finely balanced between simplicity and addictiveness - superb graphics and colour - I CANT RECOMMEND IT HIGHLY ENOUGH".

—Popular Computing Weekly.

ZX Spectrum 48K £7.50  
Written by Neil Mottershead, Simon Brattel and Martin Horsley.



## INVASION OF THE BODY SNATCHAS!

At last a version as fast and furious and as frustratingly addictive as the arcade original. Landers, Mutants, Bombers, Pods, Swarmers and much much more combine to produce the ultimate space game!

ZX Spectrum 48K £6.50  
Written by Simon Brattel and Neil Mottershead.



## THE ISLAND

The ultimate test of logic and deduction! Can you solve the hidden mysteries of the South Pacific Island on which you have been stranded - and escape alive! A brilliant classic style adventure game to fascinate and frustrate you for months!

ZX Spectrum 48K £7.50

Written by Martin H. Smith.



## ROMMEL'S REVENGE

A brilliant interpretation of the most visually stunning arcade game of all time. Superb high resolution 3D graphics with full perspective plus a host of new and exciting features make Rommel's Revenge the most spectacular game ever produced for your Spectrum!

ZX Spectrum 48K £6.50

Written by Martin Horsley.



Please Supply:

- Invasion of the Body Snatchas   
 Rommel's Revenge  The Island   
 Halls of the Things  The Dungeon Master   
 Catalogue (please enclose SAE 6in. x 9in.)

I enclose cheque/PO for .....

NAME .....

ADDRESS .....

**DEALERS!** For details of our excellent dealer discounts (including export) ring Chris Clarke on 061-205 6603.

**PROGRAMMERS!** Written any good software? send it to us for evaluation and details of our excellent royalty scheme.

Please send SAE for our latest catalogue and details of our forthcoming software.

Catalogue FREE with every order. P&P included. Please add £0.50 per item for overseas orders.

Please make cheques/PO's payable to:

CRYSTAL COMPUTING  
 2 ASHTON WAY  
 EAST HERRINGTON  
 SUNDERLAND SR3 3RX



Your choice is crystal clear

# 'The Hobbit'

The Hobbit floppy tape system is the ideal alternative to an unreliable cassette recorder and an expensive disc drive.

This is a professional digital recorder designed specifically for users of micro computers.

The Hobbit is completely under the control of your computer - no more pressing RECORD/PLAY/FAST FORWARD, etc.

Absolutely no danger of accidentally overwriting other files on the cassette. The Hobbit uses an internal filing system similar to that used by a disc, thus ensuring that there is no redundant space on your cassettes.

The Hobbit is significantly faster than an ordinary cassette recorder (READ/WRITE speed 6000 data bits/sec., ordinary cassette recorder average 960 data bits/sec.)

Typical file access time is 22 seconds; maximum is 90 seconds.

Up to 5 files may be opened simultaneously. Random access files are fully supported.

Two Hobbits may be connected to your computer to form a dual drive system.

## NO COSTLY DISC INTERFACE REQUIRED

No hidden extras - the Hobbit comes complete with everything you need, including one certified digital cassette.

The Hobbit is available now for BBC and NASCOM computers.

### Special Features for the BBC

**Zero Memory Option** The standard Hobbit operating chip sets PAGE to 1C00. With the Zero Memory Option the Hobbit does not use any of your precious RAM, thus making the transfer of programs from ordinary cassette to Hobbit even simpler.

**Power Supply Power** is taken from the external power outlet socket on the BBC computer. If your computer is not fitted with this socket a suitable power supply is available from us.

### Special Features for the NASCOM

**Microsoft Basic Upgrade Kit** Enables you to read and write files from BASIC using PRINT and INPUT statements - no more PEEKS and POKES! Supplied on a Hobbit cassette.

Operating system available in 2 x 2708 or 1 x 2716.

Normal address D000 - other addresses are available on request at no extra charge.

If you want to know more about the Hobbit before you make up your mind send to the address below for more details, or order the manual and see just how sophisticated the Hobbit really is.

If you have a different make of computer, but are interested in the Hobbit system, send us a stamped addressed envelope and details of your computer so that we can send you advance information of new products when they become available.



**IKON**

COMPUTER PRODUCTS

Available from most good computer shops or direct from: IKON COMPUTER PRODUCTS, KILN LAKE, LAUGHARNE, DYFED.  
Tel. 099 421 515. BBC Hobbit £115.00 + £3.00 p&p. BBC Second drive £120.00 + £3.00 p&p. Zero Memory Option £25.00 (£18.00 if ordered with the Hobbit). Power Supply £12.00. Manual (ordered separately) £1.50 (No VAT, refundable on purchase of Hobbit). Nascom Hobbit (boxed) £120.00. Nascom second drive £94.00. Basic Upgrade Kit £10.00. Box of 6 cassettes £17.50. Cleaning cassette £3.50. Please add VAT at the current rate to the above prices.  
ACCESS AND VISA ACCEPTED.



8335MM2/10

```

110 IF rouse=0 THEN GO TO 150
111 LET d=d+1: LET a=a-3
115 IF rouse<0 THEN GO TO Q3
116 GO TO 15
140 PRINT INK 2: AT d+10,12: " KL
KL " AT d+11,12," : GO
TO 105
150 BEEP .1: a+1: PRINT INK 2: AT
d+10,12: " MNMNMN " AT d+11,12: "
": GO TO 110
160 IF d<-10 THEN GO TO 150
161 PRINT PAPER 2: AT d+10,12: "
": GO TO 150
162 LET a=a+2: LET d=d-1
163 IF d<0 THEN LET a=a+5
164 GO TO 115
190 FOR k=1 TO 15: PRINT AT 5,5
INK 8: " A. Johnson @1990": PO
R 1=0 TO 7: PRINT AT 3,5 INK 1:
" JUNIOR MATHEMATICIAN": BEEP .00
S: RND#40: NEXT I: IF INKEY#="" T
HEN NEXT k
192 PRINT
199 IF rouse=1 THEN CLS: FOR a
=1 TO 10: FOR h=0 TO 7: PRINT IN
K h: AT 10,10: "GOODBYE!": BEEP
.005: RND#40: NEXT h: NEXT a: CLS
200 RESTORE 9010: DIM d$(5,5):
FOR e=1 TO 5: READ d$(e): NEXT
e
2010 REM Instructions
211 POKE 23592,255: PRINT
250 PRINT INK 7: " INSTU
CTIONS"

```

```

252 BORDER 0: PRINT PAPER 0: IN
K 6: BRIGHT 1: "In a moment you w
ill be shown a Menu, from whic
h you can select your chose
n operation. You will then be
given 5 questions on that
operation. If you get th
e answer right on your first att
empt you will score 5 and 1 poi
nt if you get it right on your
second attempt. At the end yo
u will be given your score on th
t section. You may do as
many sections in any combinatio
n you like. Your total score
so far will be shown with the Me
nu.
When you wish
to stop you will be presented
with your total score and p
ercentage on the whole test pl
us a few surprises."
253 PRINT INK
"PRESS ANY KEY"
255 IF INKEY#="" THEN GO TO 255
256 GO SUB 8000
290 IF level=1 THEN GO TO 302
292 IF k#="3" THEN LET smallnu
b=INT (RND#500)+100
293 IF k#<"3" THEN LET smallnu
mb=INT (RND#4000)+1000
294 LET bignumb=INT (RND#5000)+
5000
295 GO TO 305
302 LET bignumb=INT (RND#500)+5
00

```

190-192 Print in varying colours, the title  
199 Check for the end of the program  
200 Restore data for large number characters  
210-252 Instructions

253 Prompt for a key  
255 Get it  
256 Gosub and do menu  
290 Check level  
292-295 Select number

8335MM3/10

```

304 IF k#="3" THEN LET smallnum
b=INT (RND#90)+10
305 IF k#<"3" THEN LET smallnu
mb=INT (RND#400)+100
308 IF k#<"3" THEN GO TO 400
310 BORDER 7: PAPER 7: INK 2: C
LS
315 PRINT "FOR a=1 TO
5: PRINT TAB 4;d$(a) (51 TO 55):
NEXT a"
320 LET answer=bignumb+smallnum
b
330 GO TO 410
400 IF k#="2" THEN GO TO 405
401 BORDER 6: INK 0: PAPER 6: C
LS
402 PRINT "FOR a=1 TO
5: PRINT TAB 4;d$(a) (41 TO 45):
NEXT a"
403 LET answer=bignumb+smallnum
b
404 IF k#<"2" THEN GO TO 410
405 BORDER 4: INK 7: PAPER 4: C
LS
406 PRINT "FOR a=1 TO
5: PRINT TAB 4;d$(a) (45 TO 50):
NEXT a"
408 LET answer=bignumb-smallnum
b
410 PRINT AT 14,3: "

```

```

420 IF a#STR$ smallnumb THEN G
O TO 430
425 LET w#5: LET r#5: LET z#1:
LET c:=1: LET d:=4: LET t:=10: LET
a#STR$ smallnumb: GO TO 8933
427 GO TO 8935
430 INPUT z#
431 IF z#="stop" THEN GO TO 851
0
432 IF LEN z#<LEN STR$ answer T
HEN GO TO 440
435 GO TO 430
441 IF VAL z#=answer THEN GO TO
450
442 IF for1=1 THEN LET for1=2
443 IF for1=2 THEN PRINT AT 15,
10: FLASH 1: "INCORRECT DATA": BE
EP .5: -20: PAUSE 15: GO TO 500
445 IF VAL z#<answer THEN PRIN
T AT 15,10: "ERROR": AT 17,10:
" TRY AGAIN": BEEP .5: -10: PRUS
E 15
447 PRINT AT 15,10: "
": AT 17,10, "
"
449 LET for1=1
451 GO TO 430
480 PRINT INVERSE 1: AT 15,10: "C
ORRECT"
481 BEEP .25:5: BEEP .4:10: PAU
SE 15
482 IF for1=0 THEN LET a=c+5
484 IF for1=1 THEN LET c=c+1

```

302-305 Select easy numbers  
308-330 If selection three was made from the menu, then do multiplication  
400-404 If selection two then do addition  
405-408 Else do subtraction  
410-427 Print the sum in large numbers  
430 Get answer  
431 Check for stop

432 Check that the answer is fairly close (same order)  
435 Get the answer again  
441 Check for the correct answer  
442-451 Put question again  
480 Correct  
481 Wait  
482-484 Check the number of goes and update the score as appropriate

AT LAST...  
A FULLY COMPUTER  
COMPATIBLE

# Cassette Recorder

at a realistic price.



ONLY  
**£24.99**  
Free  
Postage

• THIS RECORDER IS DESIGNED SPECIFICALLY FOR COMPUTER USE

• TESTED + GUARANTEED FULLY COMPATIBLE WITH:

- |                                   |                                |                                |                                   |
|-----------------------------------|--------------------------------|--------------------------------|-----------------------------------|
| <input type="checkbox"/> SPECTRUM | <input type="checkbox"/> ZX81  | <input type="checkbox"/> BBC   | <input type="checkbox"/> ELECTRON |
| <input type="checkbox"/> DRAGON   | <input type="checkbox"/> LYNX  | <input type="checkbox"/> SHARP | <input type="checkbox"/> ORIC     |
| <input type="checkbox"/> APPLE    | <input type="checkbox"/> TEXAS | <input type="checkbox"/> TANDY | <input type="checkbox"/> GENIE    |

**FEATURES:**

- DIGITAL COUNTER
- JACK AND DIN CONNECTIONS
- BATTERY/MAINS OPERATION
- SLIMLINE STYLING

**NEW!** COMMODORE CASSETTE INTERFACE!

- Now you can use your VIC/CBM 64 with most standard cassette recorders.
- Full Computer Control.
- Comes complete with all necessary leads etc.
- Simply plug in.

ONLY  
**£14.99**  
Post  
Free

Send Now for Instant Despatch or Tel 24HR Credit Card Line

**DATTEL ELECTRONICS**

27 HOPE STREET, HANLEY,  
STOKE-ON-TRENT  
TEL: 0782 273815

## SEASIDE OFFERS FROM BLACKPOOL

COMMODORE 64 £225 + LYNX £225  
ORIC 1 48K £135 + SPECTRUM 48K £125  
DRAGON + 3 GAMES £170 + BBC-B £399

We stock Spectrum upgrades, Vic Ram packs, Dragon Demons, Apple Snapshot, BBC joysticks, ZX-keyboards, Texas leads, Atari disc cases, Oric books.

We got it all

• GAMES • EDUCATION • BUSINESS • HARDWARE •

### THIS MONTH'S SPECIALS:

- APPLE ● WIZARDRY. THE ENDLESS ADVENTURE..... £28.95
- ATARI ● DARK CRYSTAL. GRAPHIC ADVENTURE..... £27.95
- BBC ● BANDITS AT 3 O'CLOCK. AERIAL COMBAT..... £7.95
- COM 64 ● SIREN CITY. COPS CAR CHASE..... £7.00
- DRAGON ● CAVE FIGHTER. SUPER SCRAMBLE..... £8.75
- IBM ● FROGGER..... £29.95
- LYNX ● COLOSSAL ADVENTURE. MAINFRAME DOWNLOAD..... £9.95
- ORIC ● ZORGON'S REVENGE. XENON FOLLOW UP..... £8.50
- SPECTRUM ● CHUCKIE EGG???..... £6.90
- TEXAS ● LASER TANK. FUTURE BATTLE GAME..... £7.95
- VIC-20 ● PINBALL WIZARD..... £7.95
- ZX-81 ● PIMANIA. REACH THE END TO WIN £6,000..... £4.99
- ★ ORIC MACHINE CODE TOOL KIT..... £8.00 ★

"YOU ASK WE SUPPLY"

234 Church Street  
Blackpool.  
Lancashire FY1 3PX  
Telephone: (0253) 22340



HOME COMPUTERS



# Don't be fooled by its size.

This is the smallest electronic writer in the world. Although not quite as small as a matchbox, it's about as easy to carry around.

Measuring up at a phenomenal 12.7x 8.9x 1.8" and weighing in at less than 5 1/2 lbs., the Brother EP-22 manages to pack a proverbial quart of micro-electronics into a pint-sized portable, very well indeed.

In terms of performance, the Brother EP-22 is truly amazing. For a start, you can correct and store over 2,000 characters of text, then reproduce automatically as many copies as you wish.

What's more, by means of its built-in computer connectability, it can be used as a printer with a number of home or office computers.

The keyboard is standard QWERTY format with English alphabet, international symbols, accents and mathematical keys. (The latter proving particularly useful with the EP-22's integral calculator).

The EP-22 takes full size A4 paper and everything you type appears first on a 16 character LCD display, so you can check and correct before print-out.

Because the EP 22 uses a thermal dot matrix system, it operates virtually silently.

Battery powered, but with optional adaptor, the EP-22 is as mobile as it's marvellous.

But perhaps the biggest attraction of this little beauty is the price. Only £169.95 including VAT.

**brother**

Fast becoming the biggest name in typewriters.

BROS + BROTHER OFFICE EQUIPMENT DIVISION  
SHEPPIES STREET, GURD, BRIDGE, ALDERSHOT, HANTS GU14 9JH  
BROTHERS INDUSTRIAL LTD, NAGOYA, JAPAN.

AVAILABLE FROM: WILDINGS OFFICE EQUIPMENT, SELF RIDGES, RYMANS AND ALL GOOD OFFICE EQUIPMENT RETAILERS.

## PCNProgramCards

### Mini Math Card 4 of 11

8335MM4/11

```

500 IF for1=2 THEN PRINT AT 16,
E; THE ANSWER WAS ";answer: PAUSE
510
502 PRINT AT 16,5;"
      LET count=count
+5
510 LET for1=0: IF count=25 THE
N GO TO 5500
515 GO TO 290
1000 CLS: PRINT INK 9; "....."
"DO YOU WANT TO SKIP THE NEXT
F us="y" OR us="yes" THEN GO TO
3000
1005 REM Stop Routine
1005 IF us<"y" AND us<"yes" AN
D us<"no" AND us<"n" THEN GO T
O 1000
1010 CLS: PRINT INK 9; "....."
AB 0; FLASH 1;"WAIT A MOMENT"
1040 RESTORE 9100
1050 FOR w=144 TO 164: FOR e=0 T
O 7: READ h: POKE USR CHR$ w+e,h
: NEXT e: NEXT w
1070 IF tsc=0 THEN GO TO 1500
1100 IF INT (tsc/tcount*100+.5) <
5 THEN GO TO 1500
1150 REM Teacher Routine
1151 CLS: LET e=0
1155 LET x=7: LET q=0
1156 BORDER 0: PAPER 0: INK 7: C
LS: FOR a=1 TO 16: PRINT "BRA
INBOX ": PRINT INK 6;"BRAINBOX
": PRINT INK 5;"BRAINBOX ":
PRINT INK 2;"BRAINBOX ": NEXT a

```

- 1040-1050 Set up user-defined graphics for Fool on the Hill and teacher.  
 1070 Check total score.  
 1100 Check percentage.  
 1150 Start of teacher routine.

```

1157 FOR a=1 TO 50 STEP 2: BEEP
101 a: NEXT a
1160 DIM c(30): DIM d(30)
1162 INK 7: PAPER 0: BORDER 0: C
LS
1165 RESTORE 9700: FOR a=1 TO 22
: READ c,d: LET c(a)=c: LET d(a)
=d: NEXT a
1170 PRINT INK 6;"TAB 7: FLASH
1: BRIGHT 1;"CONGRATULATIONS!"
1175 INK 6: FOR a=70 TO 130: PLO
T 100,a: DRAW 52,0: NEXT a: PRIN
T INK 1: PAPER 6; AT 6,23;"SCHOOL
": PRINT PAPER 0; AT 9,23;"A
T 10,23;" : AT 11,23;" : AT
12,23;" " : AT 13,23;" " :
1175 PRINT INK 2; AT 2,2;" "
: AT 3,2;" " : AT 4,2;" "
1180 INK 2: FOR a=70 TO 130: PLO
T 20,a: DRAW 39,0: NEXT a: PRINT
AT 9,3; PAPER 0; " : AT 10,3
: " : AT 11,3; " : AT 12,3
: " : AT 13,3; " : AT 14,3
: " : AT 15,3; " : AT 16,3
: " : AT 17,3; " : AT 18,3
: " : AT 19,3; " : AT 20,3
: " : AT 21,3; " : AT 22,3; "
ONE"
1200 LET w=1
1200 RESTORE 9750: LET q=0
1230 FOR z=1 TO 7: READ a$,b$,c$
e$,y: RESTORE 9750+q: PRINT INK
7; AT 9,y;" : a$; AT 10,y;" : b$;
AT 11,y;" : c$; AT 12,y;" : e$;
: BEEP c(w),d(w)
1240 LET q=q+1
1245 IF w=22 THEN LET e=e+1: LET
w=0

```

- 1162 Set up screen colours.  
 1165 Read congratulations data.  
 1175-1180 Draw the school and home.  
 1220-1230 Read data for movement of teachers.  
 1240-1300 Move teacher.

## PCNProgramCards

### Mini Math Card 5 of 11

8335MM5/11

```

1255 IF e=3 AND w=21 THEN GO TO
1300
1300 IF q=8 THEN LET q=0
1305 IF q=7 THEN LET x=x+1
1308 LET w=w+1: NEXT z: GO TO 12
300
1300 BEEP 5,5: PRINT AT 9,17;"
      : AT 10,17;" : AT 11,17;"
      : AT 12,17;" : PRINT INK 7: P
APER 0; AT 9,24;"P": AT 10,23;"BUC
": AT 11,24;"H": AT 12,23;"JIK"
1340 PRINT PAPER 0; INK 7; AT 14,
4;"YOU SCORED ";tsc;" OUT OF ";t
count;" : AT 16,4;"YOUR PERCENTA
GE WAS ";INT (tsc/tcount*100+.5)
1350 PAUSE 100
1450 GO TO 3000
1500 LET d=0: PAPER 5: INK 4: BO
RDER 5: CLS
1510 LET s=0: LET a=110: LET b=9
5: LET c=32
1520 PLOT a,b: DRAW c,d: LET a=a
-1: LET b=b-1: LET c=c-2
1525 IF c>200 THEN GO TO 1530
1527 GO TO 1500
1530 PRINT INK 2; AT 0,5; INVERSE
1;"THE FOOL ON THE HILL"
1532 PLOT 0,s: DRAW 255,0: LET s
=s+1: IF s>10 THEN GO TO 1535
1533 GO TO 1520
1500 DIM g(33): DIM h(33)
1510 RESTORE 9600: FOR a=1 TO 33
: READ c,d: LET g(a)=c: LET h(a)
=d: NEXT a
1540 LET w=1

```

- 1340 Print percentage score.  
 1350 Wait.  
 1450 Jump to fall of fame.  
 1500 Begin the routine used if the score is less than 50 per cent select colours.

```

1645 RESTORE 9500: LET q=0
1650 FOR z=1 TO 8: READ a$,b$,c$
e$: RESTORE 9500+q: PRINT INK 0
: AT 5,18;" : AT 6,14;a$: AT 7,14;
b$: AT 8,14;c$: AT 9,14;e$: BEEP q
(w),h(w)
1670 LET q=q+1
1672 IF w=33 THEN GO TO 1850
1673 IF q=8 THEN LET q=0
1675 LET w=w+1: NEXT z
1800 GO TO 1650
1850 PRINT INK 7: PAPER 0; AT 16,
1;"YOUR FINAL SCORE WAS ";tsc; AT
17,3;"OUT OF ";tcount;" : AT 18
1;"YOUR PERCENTAGE WAS ";INT (t
c/tcount*100+.5): PAUSE 150
2000 CLS: IF tsc=0 THEN GO TO 4
500
3000 IF arraysame=1 THEN GO TO 3
010
3001 DIM y$(10,5): DIM u(10): DI
M v(10): DIM s(10): DIM l(10): D
IM r$(10,5): FOR z=1 TO 10: LET
y$(z)="J.H.": LET r$(z)="J.H.":
NEXT z
3011 LET y=1
3020 IF l(y)=0 THEN GO TO 3030
3030 IF INT (tsc/tcount*100+.5) >
INT (s(y)/l(y)*100+.5) THEN GO T
O 3030
3040 LET y$(y)=r$(y): LET u(y)=s
(y): LET v(y)=l(y)
3045 IF y=10 THEN GO TO 4100

```

- 1520-1533 Fool on the Hill.  
 1600-1800 Move the Fool on the Hill.  
 1850-2000 Final score.  
 3000 Dimension it and set it up.  
 3011-3930 Sort the high score table.

# GET YOUR HANDS ON ONE...



## The Spectravision Quickshot deluxe joystick (BBC compatible)

Now, Microstyle offer you the chance to use a joystick where joysticks have never been used before! Operating directly through the existing user-ports on your BBC model B microcomputer and available for use with all Acornsoft and most other keyboard controlled games even Planetoids — these joysticks include a machine-code 'driver program' on tape, which converts keyboard commands to remote control operation for maximum enjoyment.

**only £19.95** inc VAT

for mail order please add 75p P&P

**NEW  
SHOP**  
OPENS NOV 5

The Aylesbury Computer Centre  
52 Friar's Sq., Aylesbury.  
Telephone: Aylesbury (0296) 5124

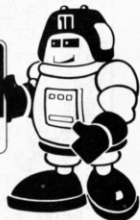
The Bath Computer Centre  
29 Belvedere, Lansdown Road, Bath.  
Telephone: Bath (0225) 334659

The Daventry Computer Centre  
67 High St., Daventry.  
Telephone: Daventry (03272) 78058

The Newbury Computer Centre  
47 Cheap Street, Newbury.  
Telephone: Newbury (0635) 41929

**MicroStyle**  
THE HOME COMPUTER PEOPLE

Please Note: While Microstyle will endeavour to maintain sufficient stocks of items currently or previously advertised we regret that all items are offered for sale subject to availability from manufacturers.



# ...BEFORE THEY DO!

# PCN Program Cards

## Mini Math Card 6 of 11

8335MM6/11

```

3905 LET y=y+1: GO TO 3920
3900 GO TO 4000
3900 LET y$(y)=s$: LET v(y)=tsc:
    LET v(y)=tcount
3905 IF y=10 THEN GO TO 4100
3910 LET y=y+1: LET v$(y)=r$(y-1)
    ): LET v(y)=(y-1): LET v(y)=t(y
-1)
3920 IF y>9 THEN GO TO 4100
3930 GO TO 3905
4000 BORDER 0: INK 7: PAPER 0: C
LS : IF INT (tsc/tcount+100+.5) <
=50 THEN PRINT INK 7: PAPER 0:
    WELL DONE, CLEVER 'UN,
    YOU'VE SCORED AMONG THE
    BEST OF 'EM.

```

```

PLEASE NOW ENTER YOUR NAME,
FOR THE WORLD TO STARE IN
AWE AT IN THE ": PRINT INK
5: "HALL OF FAME."
4020 IF INT (tsc/tcount+100+.5) <
50 THEN GO TO 4050
4030 GO TO 4075
4030 BORDER 0: INK 7: PAPER 0: C
LS : IF INT (tsc/tcount+100+.5) <
=50 THEN PRINT INK 7: PAPER 0:
    EVEN THOUGH YOU SCORED LESS
    THAN 50 PERCENT,
    I BEAR NO GRUDGE AND GIVE
    MY CONSENT.

```

FOR YOU TO ENTER YOUR NAME,  
SO IT MAY BE DISPLAYED

4000 Print rhyme.  
4020 Check for 50 per cent.  
4075 Get name.  
4077 Check length.

```

IN THE ": PRINT INK 5: "HALL
OF FAME"
4075 INPUT INVERSE 1: "ENTER NAME
(max 5 letters)" : s$
4077 IF LEN s$ > 5 THEN GO TO 4075
4080 GO TO 3900
4200 REM Hall of Fame
4210 PAPER 0: INK 5: BORDER 0: C
LS
4230 PRINT INK 6: BRIGHT 1: "
H A L L O F F A M E "
4240 FOR a=1 TO 10: PRINT BRIGHT
1:a: " : v$(a) : IF v(a)=0 OR v
(a)=0 THEN PRINT BRIGHT 1: " :
% (" : v(a) : " OUT OF " : v(a) : )
4242 IF v(a)=0 OR v(a)=0 THEN GO
TO 4250
4245 PRINT BRIGHT 1: " : INT ((v
(a)/v(a+100+.5)) * " : v(a) : " O
UT OF " : v(a) : ) : GO TO 4250
4250 NEXT a
4500 PRINT INK 7: "DO YOU WANT
TO GO BACK TO THE STR
RT?"
4505 LET a=0
4510 BEEP .009,RND#20: POKE 2262
9,a: POKE 22631,a: POKE 22633,a:
POKE 22635,a: POKE 22636,a: POK
E 22640,a: POKE 22643,a: POKE 22
645,a: POKE 22647,a: POKE 22649,a
a: IF INKEY$<"n" OR INKEY$<"y"
THEN LET a=a+1
4511 IF a>7 THEN LET a=0
4512 IF INKEY$="y" OR INKEY$="n"
THEN GO TO 4520

```

4080 Put the name into the high score table.  
4200-4250 Print the hall of fame.  
4500 Back to beginning ? prompt.  
4505-4700 Get answer and act upon it.

# PCN Program Cards

## Mini Math Card 7 of 11

8335MM7/11

```

4513 GO TO 4510
4520 IF INKEY$="y" THEN GO TO 95
00
4500 IF INKEY$<"n" AND INKEY$<
" " THEN GO TO 4510
4700 LET rcount=1: GO TO 2
5000 IF s<12.5 THEN GO TO 5500
5010 CLS: PRINT " INVERSE 1:
WELL DONE YOU MANAGED TO GET
OVER HALF THE ANSWERS RIGHT ON
SECTION " : s$ : " I'VE GOT A
SURPRISE FOR YOU! : PRINT "TAB
2: FLASH 1: "DO YOU WANT IT?(y o
r n)
5011 IF INKEY$="" THEN GO TO 501
1
5013 IF INKEY$="n" THEN GO TO 55
10
5015 IF INKEY$="y" THEN GO TO 50
00
5017 IF INKEY$<"n" AND INKEY$<
" " THEN GO TO 5011
5100 CLS: PRINT "
For Elise"
5110 RESTORE 9020: FOR a=1 TO 9:
    READ c,d: BORDER INT (RND#7): B
EEP c,d: NEXT a
5120 GO TO 5810
5200 CLS: PRINT "
YESTERDAY
5210 RESTORE 9030: FOR a=1 TO 29
    READ c,d: BORDER INT (RND#7):
    BEEP c,d: NEXT a
5220 GO TO 5810

```

5000 Check score.  
5010-5017 Surprise ?  
5100-5120 Music for Für Elise.  
5200-5220 Music for Yesterday.  
5300-5320 Music for Sound of Silence.  
5400-5420 Music for The Entertainer.

```

5300 CLS: PRINT "
THE
SOUND OF SILENCE"
5310 RESTORE 9040: FOR a=1 TO 55
    READ c,d: BORDER INT (RND#7):
    BEEP c,d: NEXT a
5320 GO TO 5810
5400 CLS: PRINT "
THE ENTERTAINER"
5410 RESTORE 9050: FOR a=1 TO 79
    READ c,d: BORDER INT (RND#7):
    BEEP c,d: NEXT a
5420 GO TO 5810
5500 CLS: PRINT "
I AM VERY
DISAPPOINTED IN YOU! YOU GOT
LESS THAN HALF RIGHT."
5510 RESTORE 9060: FOR a=1 TO 11
    READ c,d: BEEP c,d: NEXT a
5530 GO TO 5810
6000 IF level=1 THEN GO TO 5050
6010 LET a=INT (RND#9)+1: LET an
swer=INT (RND#500)+500
6015 GO TO 6055
6050 LET a=INT (RND#9)+1: LET an
swer=INT (RND#90)+10
6055 LET boxnumb=answer
6060 INK 6: PAPER 0: BORDER 0: C
LS
6065 PRINT AT 6,8:
"AT 9,8: "AT 7,8: "AT 8,8:
"AT 10,8: "AT 11,
8: "AT 12,8:
6070 LET c=1: LET d=4: LET z=1:
LET r=5: LET t=0: LET a$=STR$ a:
GO TO 7550

```

5500 Disappointed.  
5510 Funeral March.  
6000 Get new answers for level one division.  
6065 Print division on the screen.  
6070-6120 Set up variables.

# We CAN talk to each other . . .



- LINK INTO A WORLD OF COMPUTER INFORMATION BANKS.
- EXCHANGE INFORMATION OR PROGRAMS FROM USER TO USER DIRECT.
- CONNECTS TO YOUR MICRO\* OR TERMINAL VIA AN RS232 SERIAL LINK.
- OPERATES TO A V23 (PRESTEL) STANDARD AND AT 1200/ 1200 BITS PER SECOND HALF DUPLEX FOR USER TO USER.
- SOFTWARE COMMUNICATIONS PACKAGES AVAILABLE FOR MOST POPULAR MICRO'S.
- BT APPROVED S/ 1399/3/D/02 1907

Designed to fit neatly under a telephone handset, the TELEMOD 2 modem simply connects to the telephone line via the new BT modular plug. An extension socket on the rear of the modem allows you to connect in your own telephone making the system truly compact.

TELEMOD 2 is designed with the latest integrated technology to not only give you a more reliable modem but also one that won't cost you a fortune!

O.E.L. has specially designed communications packages for popular micro's that include a serial interface unit (if required), software, connecting leads and full instructions.

Within a few minutes of connecting TELEMOD 2 and a Viewdata comms package to, for example, an APPLE IIe you can have access to 240,000 pages of PRESTEL information including a link to Telex, Mailbox, Teleshopping, Homebanking and even Telesoftware for your micro!



O.E. Limited,  
Industrial Estate,  
Appleby-in-Westmorland,  
Cumbria CA16 6 HX

Telephone: 0930 51909  
Mailbox No. 093051909

Please send me the TELEMOD II.

I enclose a cheque/postal order made payable to O.E.Ltd. for **£84.95** inc.VAT

Name \_\_\_\_\_ Company \_\_\_\_\_  
Address \_\_\_\_\_  
Tel. No. \_\_\_\_\_

Distributor: SYNCOMP SERVICE LTD

PLEASE ALLOW 28 DAYS FOR DELIVERY

Prestel and the Prestel symbol are trademarks of British Telecommunications.

P.O. BOX 42, SOUTHPORT  
MERSEYSIDE, PR9 0UR



# MORE THAN A LOAD OF BALLS



The pink's teetering on the edge of the pocket, the red's partially blocked, and now it's make or break.

Do you add a touch of spin or do you play safe?

Do you try for the trick shot or go for the snooker?

Visions Snooker brings all the excitement and all the tension of big time tournaments to your TV set.

With an advanced programme written by a 19 year old undergraduate at Queens College Cambridge, it makes Pot Black look like a load of old balls.

Visions **Snooker**. It's an exciting test of your skills on the cue. And it's yet another great game from Visions.

The ultimate name in video games.

3 SPECTRUM 16C 1600K 8 & ELECTRON  
VIC 20 24 COMMODORE 64



SNOOKER VS-03-14  
£8.95

3 SPECTRUM



SHEER PANIC VS-02-16  
£8.95

3 SPECTRUM



PITMAN SEVEN VS-01-48  
£8.95

## Visions

FANS PLEASE NOTE! ALSO AVAILABLE MAIL ORDER  
FROM VISIONS (SOFTWARE FACTORY) LTD  
1 FELGATE MEWS, STUDLAND STREET, LONDON W6

01-7487478



## Multi-Square Card 1 of 2

8335MS1/2

```

100 CLS:INK0:PAPER3
110 PRINT:PRINT:PRINT:PRINT:
120 PRINT"This program is a multiplication"
130 PRINT
140 PRINT"program"
150 PRINT
160 PRINT
170 PRINT"Answer the questions printed"
180 PRINT
190 PRINT"at the bottom of the screen"
200 WAIT 200
210 CLS
220 PRINT
230 FOR S = 1 TO 9
240 PRINT S;" ";SPC(1)
250 NEXT S
260 PRINT
270 FOR M=2 TO 9
280 PRINT "-----"
290 PRINTM"!";

```

Oric 1  
Oric BasicAuthor: D Ross  
Application: Education

```

300 FOR M1 = 2 TO 9
310 PRINT " !";
320 NEXT M1:PRINT
330 IF M =9 THEN 350 ELSE 340
340 PRINT " | | | | | | | | | "
350 NEXT M
360 :
370 A=1:A1=1
380 A = A+1*INT(RND(1))+.5)
390 IF A>9 THEN A =A-B
400 IF A <2 THEN A =A+7
410 A1=A1+1*INT(RND(1)+.5)
420 IF A1>9 THEN A1=A1-B
430 IF A1<2 THEN A1=A1+7
440 IF S(A,A1)>0 THEN 380
450 :
460 PLOT A*4-3,A1*3-3 , "?"
480 Q$=STR$(A)+" TIMES "+STR$(A1)
490 PLOT 9,26,Q$
500 INPUT R$
505 PRINT CHR$(11);" ";CHR$(11)

```

100 Clear screen and set black text on a yellow screen  
 110-190 Instructions  
 210-350 Print the grid  
 370-430 Generate random questions

440 Check whether the question has been answered correctly, already  
 460 Plot a question mark in the correct place on the grid  
 480-490 Plot the question at the bottom of the screen

## Multi-Square Card 2 of 2

8335MS2/2

```

510 IF VAL(R$)=A*A1 THEN PLOT A*4-3,A1*3-3,R$:S(A,A1)=A*A1:PING:C=C
+1
520 IF C=64 THEN WAIT50:GOTO570
530 IF VAL(R$)<>A*A1 THEN PLOT A*4-3,A1*3-3,"*":ZAP
540 IF R$="Q" THEN DOKE 621,48000:CLS:END
550 :
560 GOTO 380
570 DOKE 621,48000
580 INK4:PAPER 6
590 FOR N=1 TO 200STEP5:WAIT5
600 SOUND 1,N,12 :NEXT N
610 FOR N=200 TO 1 STEP-5:WAIT 5
620 SOUND 1,N,12 :NEXT N
630 PLAY 0,0,0,0
640 CLS: PRINT:PRINT:PRINT:PRINT:PRINT
650 PRINTCHR$(4),CHR$(27)"J CONGRATULATIONS"
660 PRINT:PRINT:PRINT:PRINT,CHR$(27)"J YOU HAVE MASTERED"
670 PRINT:PRINT:PRINT:PRINT,CHR$(27)"N THE MULTISQUARE"
680 PRINTCHR$(4)
690 END
1000 LIST 100-320
1010 GOTO 1010

```

510 Plot the correct answer on the screen and increment the count of correct answers. Sound a chime  
 520 Check if the square is complete  
 530 Plot a star if the answer is wrong. Sound a buzzer  
 540 Allow the user to end the program

570 Restore scrolling  
 590-630 Play a jingle  
 640-690 Print the congratulations message, double height and flashing

# 60 PROGRAMS - £4.95

(LESS THAN THE PRICE OF A SINGLE CASSETTE!)

**A new force in computer publishing.** You can be sure that these new books which introduce a new range of paperbacks are the best - they're published by Britain's bestselling paperback publisher and the country's most successful and authoritative computer magazine - Pan and Personal Computer News.

**The most successful software writers** have been commissioned to write a completely new collection of programs for each of the most popular and fast-selling microcomputers. **Robert Erskine** is a programmer whose software has topped bestseller lists. **Humphrey Walwyn** is a broadcaster, magazine

columnist and experienced software writer.

**Not just the same old replays.** You'll be amazed how much has been packed into these new books. The emphasis is on games, and versions of the standard arcade classics are included, such as Moonlander, Space Invaders and Pacman. Added to these are other innovative arcade-type games, while less warlike enthusiasts can try Postman, Tug of War or even play the commercial market with Assetstripper. Other categories among the 60 program listings are board-style and tactical games with words and numbers, and educational and

kids games. Useful programs, too, like Holiday Expenses, how to learn about critical path analysis, work out paypackages - and much much more. With around 320 pages these large paperbacks are unbeatable value!

**Where can you get them?** From all good bookshops. Or fill in the coupon below and return it to

Pan Books Ltd.,  
FREEPOST, P.O. Box 109,  
14-26 Baker Street,  
High Wycombe,  
Bucks HP11 2TD.

**For immediate 24 hour service**  
phone 01-200 0200 and use your  
credit card.



GET MORE OUT OF YOUR MICRO WITH...

## 60 PROGRAMS

POST NOW, NO STAMP NEEDED To Pan Books Ltd., FREEPOST, P.O. Box 109, 14-26 Baker Street, High Wycombe, Bucks HP11 2TD. YES Please send me the following **60 PROGRAMS**... paperbacks at £4.95 each plus 35p for the first book ordered plus 18p for each additional book to a maximum charge of £1.25 to cover postage and packing.

name (Mr/Mrs/Miss/Ms) \_\_\_\_\_  BBC Micro  Sinclair ZX Spectrum  
address \_\_\_\_\_  Oric1  Dragon32

\_\_\_\_\_ post code \_\_\_\_\_  
I enclose my cheque/postal order for £ \_\_\_\_\_ payable to Pan Books Ltd or debit my Access/Barclaycard/Visa/Trustcard

Signature \_\_\_\_\_ no. \_\_\_\_\_

Allow up to 15 days for delivery. This offer available within UK only.  
Pan Books Ltd Registered in England Registration No. 389591

Pan

PERSONAL  
COMPUTER  
COMPUTER NEWS LIBRARY

PCN 2

**Issue 1, March 11-18.**  
**Pro-Tests:** Apple's Lisa, Text TX8000; Spectrum speech synthesizer; Apple printer; Commodore notebook; 3D on Spectrum; graphs package for Apple and IBM; BBC graphics system.  
**Features:** computer chess, Occam parallel processing language, Virgo/Sirius function keys.  
**Programs/Cards:** Towers of Braham (Pascal), Borthorn (Apple II), Rotary Year (Apple II), Shape Utility (Apple II).  
**Gameplay:** Darts, Soccer (Atari), Game of Riddos (BBC), Mania (BBC), Pimania (Spectrum); Flight Simulator (IBM PC).  
**Databases:** micros and peripherals.

**Issue 2, March 18-25.**  
**Pro-Tests:** Toshiba T100, Casio PB100, ZX81; Basic; Vic speech synthesizer; Spectrum spreadsheet; IBM graphics; BBC word processing.  
**Features:** Colovision, micro backgammon, nursing computer.  
**Gameplay:** Ultima II (Apple), Tracker (ZX81), Starquest (Vic 20), Hungry Horace (Spectrum).  
**Programs/Cards:** String editor (Spectrum), Analogue Clock (BBC Model B), Chart generator (Spectrum), String extract/replace.  
**Databases:** full software listings.

**Issue 3, March 25-April 1.**  
**Pro-Tests:** TI Professional, Apple speech synthesiser, Fiat 410 printer, IBM keys boards, Petscod compiler, Sirius toolkit, Dragoon.  
**Features:** Atom upgrade, Lynx programming, Apple music.  
**Gameplay:** Mangrove (Vic 20), Mutant Heed (Vic 20), Compendium (Dragon), Patience (Spectrum), Noughts and Crosses (Dragon), Great Britain Ltd (Spectrum), Ulysses (IBM PC).  
**Programs/Cards:** Magnify (Spectrum), Speller (Vic 20), Firing Range (BBC).  
**Databases:** micros.  
**Microspedia:** Anatomy of the BBC, part 3.

**Issue 4, April 1-8.**  
**Pro-Tests:** Piel Printer Communicator, Olympia ES160 printer, Namal Superpack, Commodore Calcutral, Spectrum Cash, Cashbook (BBC).  
**Gameplay:** Dark Crystal (Apple II), St George (Dragon), Wizard W (Dragon).  
**Programs/Cards:** Fruit Machine Editor, Transmith (Oric), Axxay Editor.  
**Databases:** peripherals, computer clubs and groups.  
**Microspedia:** Go Forth, part 1.

**Issue 5, April 8-15.**  
**Pro-Tests:** Commodore 700, Ikon Hobbit, 1-2-3 (IBM), ZX81 machine code.  
**Features:** speech packs, monitors.  
**Gameplay:** Grand Prix (Dragon), Spectrum Day (Spectrum), Dealings (Apple).  
**Programs/Cards:** Wacky Racers (Oric), Fruit Machine (C64), Parse Integer.  
**Databases:** Software.  
**Index:** full list of user groups.  
**Microspedia:** Go Forth, part 2.

**Issue 6, April 15-22.**  
**Pro-Tests:** Tycom Microframe, IBM PC, Scorpio Dots, Commodore music module, ZX81 graphics, Bottom Line Strategist (Dragon), SuperClip word processor.  
**Features:** IBM PC/DOS, BBC word processing, PC-1251.  
**Gameplay:** Minced Out (Spectrum), Translavian Tower (Spectrum), Luan Leaper (Apple II), Evolution (Apple II).  
**Programs/Cards:** Wacky Racers (Oric), Mortgage Comparison

(Sharp MZ80K), Computer Set Up (BBC), Day of Week.  
**Databases:** micros.  
**Microspedia:** Graphics, part 1.

**Issue 7, April 22-29.**  
**Pro-Tests:** Mattel Aquari, Epson FX30, Olivetti JP101, Lisr, Vic 20 assembler, Supergrab on Vector/Sirius.  
**Features:** Dealer support, Atari graphics.  
**Gameplay:** Krakit (ZX81), Cruising On Broadway (Spectrum), Kites (Vic 20), Fantastic Voyage (ZX81).  
**Programs/Cards:** CIMB controls, Computer Set Up (BBC), Wacky Racers (Oric), Julian Dates.  
**Databases:** Peripherals.

**Issue 8, April 29-May 6.**  
**Pro-Tests:** Atari Home Files Manager, Kohra's Vic Star for the Vic 20, Heston's Accounts for the Spectrum, Epson RX80 printer, NCR's Decision Mate V, Future Computer EX20.  
**Features:** Micronet, Compact programming on the TP99A4, Harvestor (Vic 20), Strategic Command (Dragon 32), A first book of Micro Rhymes (BBC), Telling the Time-Money (Spectrum).  
**Programs/Cards:** Program Indexer (BBC), CIMB Databases cards 1-4, Sort Extract.  
**Databases:** software.

**Issue 9, May 6-13.**  
**Pro-Tests:** Structured Basic on the Apple, Pixel Power on the Vic 20; Star DP110 printer, Dams and darts interfaces for Commodore 64; Micro-Processor.  
**Features:** BBC function keys, Atari serial cards (Spectrum).  
**Gameplay:** Dungeons of Intrigue (Oric), The Gentle Oric, Starship Command (Spectrum), The Wizard's Novonok's Puzzle (Spectrum).  
**Programs/Cards:** Lower case (Dragon 32), Monitor (Spectrum), Wildcard Search (MBasic).  
**Databases:** Graphics, part 4.  
**Microspedia:** Graphics, part 4.

**Issue 10, May 13-20.**  
**Pro-Tests:** Informant on Commodore 64, Spectrum Mail, Commodore CMM800 music synthesizers (Apple), Primus directly coupled modems.  
**Features:** ZX81 graphics part 1; Atari word-processing part 2; Commodore Rescue (Spectrum), Dictator (Spectrum), Roman Empire (Spectrum), Choplifter (Vic 20), Skyhawk (Vic 20).  
**Programs/Cards:** Union Jack (Lynx), Escape (Spectrum), CIMB Database cards 7-9, Evaluate (MBasic), Formula (BBC B).  
**Databases:** peripherals.  
**Microspedia:** Graphics, part 5.

**Issue 11, May 20-26.**  
**Pro-Tests:** BBC Vuffel, PFS file for IBM, Apple Pascal, printer for Commodore 64, joystick controller for ZX81 and Spectrum; CVI Computer Board.  
**Features:** ZX81 graphics part 2, Basic on the Sharp MZ80K.  
**Gameplay:** Motor Mania (Commodore 64), Iron Flight, BBC Music Synthesiser, Music Maker (Spectrum), Embury Assault (Spectrum), Tobor (Spectrum) and Program cards; Homeward Bound (ZX81), Connect Four (Dragon 32), CIMB Database cards 10-11.  
**Microspedia:** Keyboards.

**Issue 12, May 27-June 2.**  
**Pro-Tests:** Spectrum word processor, PFS-Report on IBM, File Handling for Colour Genre; CII CP8 type 1 printer, IG Trackball, Sord MS.  
**Features:** Epson Basic, Oric sound card, Commodore 64, Atari graphics.  
**Gameplay:** Mad Martha (Spectrum), Freddy Spectator (Oric round-up), Program cards; Election Headcount (BBC B), Montage (BBC B), Munch (Spectrum).  
**Databases:** Hardware.  
**Microspedia:** Keyboard, Microspedia: Disk Drives, part 1.

**Issue 13, June 3-9.**  
**Pro-Tests:** Teletwister for Dragon 32, Abernethi Fort for Spectrum, Graphics processing system for Apple II+; joystick, rulers, Aple.  
**Features:** Dragon meets Tandy, Oric music part 2, transferring IBM for Colour Genre and Genre.  
**Gameplay:** Everest Ascent (Spectrum), Colour Genre round-up, Colour Maze (Jupiter Ace), Qix (Atari).  
**Programs/Cards:** Cupid (Oric), Horace (Dragon 32), Time Bomb (Atari).  
**Databases:** peripherals.

**Issue 14, June 10-June 15.**  
**Pro-Tests:** Apple Animator II board, Modula-2 (Apple II), Oric-Basic, Joystick Control Unit J6, Kempton Centronics Interface, BBC Speech Synthesiser.  
**Features:** Newbrain Basic part 1, Sirius designing.  
**Gameplay:** As Dididums (Spectrum), Monopole (Commodore 64), Antonomosyl (Spectrum), Dragon dramatics.  
**Programs/Cards:** Time Bomb (BBC B), Sheep Drive (BBC B).  
**Databases:** Software.  
**Microspedia:** Spectrum, part 1.

**Issue 15, June 16-June 22.**  
**Pro-Tests:** Com 35, Address Manager (Spectrum), Spies (Commodore 64), MST Database (Epson HX-20), Voice Input Module (Apple II).  
**Features:** Newbrain Basic part 2, Genre chess.  
**Gameplay:** Cleared for Landing, Playing the Ace (Apple II), Vultures, Star Jammer (Dragon 32).  
**Programs/Cards:** Mover (BBC B), Sprite Clock (Commodore 64), Pirate Island (Atari, 3 of 9), Mono-mind (Colour Genre), Brinkbat (Dragon 32).  
**Databases:** Hardware.  
**Microspedia:** Spectrum, part 2.

**Issue 16, June 23-June 29.**  
**Pro-Tests:** Atari V Acorn, word processing for the Commodore 64, Spectrum Mail, MPF-11 printer, Z80 Pack for BBC.  
**Features:** ZX81 Maths, US mail code (Spectrum), Computer Scrabble (Spectrum), Education (BBC B), Horace and Spiders (Spectrum), Catcha Nautica (Vic 20).  
**Gameplay:** Video Tiler (TP99A4, 3 of 6), Bowling (Spectrum), Pirate Island (Atari) cont.  
**Microspedia:** Spectrum, part 3.

**Issue 17, June 30-July 6.**  
**Pro-Tests:** Duet 16, The Organizer (CP/M), Trace and ZX Text (Spectrum), Juki 6109 daisywheel, Videx Ultra Term (Apple II).  
**Features:** Leaving part 1, Atari screen action.  
**Gameplay:** Chess, Grand Master (Commodore 64), Escape from Orion (BBC), Jet Pac (Spectrum), The Ring of Darkness (Dragon 32), Spectrum spectacle.  
**Programs/Cards:** Video Tiler (TP99A4, cont.), Pirate Island (Atari) cont., Word Processor (BBC).  
**Microspedia:** Sound, part 1.

**Issue 18, July 7-July 13.**  
**Pro-Tests:** Tandy 100, RS232 interface, ROM pager (Commodore), Interface printer buffer, IBM Personal Basic, Spectrum assembler, Newbrain WP.  
**Features:** Leaving part 2, Lynx music.  
**Gameplay:** Spectrum Backgammon, BBC Snooker, Commodore 64 round-up, Serpentine (Vic 20), Put (Spectrum), Spectrum Safari.  
**Programs/Cards:** Word Processor (BBC), Fruit Machine (Spectrum).  
**Microspedia:** Sound part 2.

**Issue 19, July 14-July 20.**  
**Pro-Tests:** 16-bit chips, Stock control (Epson HX20), Malplus (Torich), Smith-Corona daisy-wheel, ZX81 word processing.  
**Features:** Insurance, buying second-hand.  
**Gameplay:** Escape MCF (C64), Escape from Perilus (Atari), Apple round-up, Temple of Aphasi (C64), Airline (Spectrum), Heathrow (Spectrum).  
**Programs/Cards:** Colour Code (BBC), (Dragon).  
**Microspedia:** Sound part 3.

**Issue 20, July 21-July 27.**  
**Pro-Tests:** Tandy 100, RS232 interface, ROM pager (Commodore), Interface printer buffer, IBM Personal Basic, Spectrum assembler, Newbrain WP.  
**Features:** Leaving part 2, Lynx music.  
**Gameplay:** Spectrum Backgammon, BBC Snooker, Commodore 64 round-up, Serpentine (Vic 20), Put (Spectrum), Spectrum Safari.  
**Programs/Cards:** Word Processor (BBC), Fruit Machine (Spectrum).  
**Microspedia:** Sound part 2.

**Issue 21, July 28-August 3.**  
**Pro-Tests:** Electron, Samsis Basic, Oric monitors, Microdrive.  
**Gameplay:** Magic Mountain, Smugglers Cove (Spectrum), Spectrum round-up, Matrix (64), Ninja Warrior (Dragon), Dallas, (Oric), Call to Arms (IBM).  
**Microspedia:** Commodore 64.

**Issue 22, August 4-August 10.**  
**Pro-Tests:** Spectrum Fourth, BBC graphics, Music synthesiser, IBM plotter, Brother daisywheel, Maltron keyboard, Muped.  
**Features:** Genre assembler, Dragon machine code.  
**Gameplay:** River Rescue, Ore Attack (Atari), Zork (64), Knot in 3D, 3D Combat Zone (Spectrum), Moria (Oric), Velnor's Lair (Spectrum).  
**Microspedia:** CP/M part 1.

**Issue 23, August 11-August 17.**  
**Pro-Tests:** Sord Basic 6, Tasword, EFT, Atari Supergraphics, Microdrive, Tandy Modem 4.  
**Features:** Dragon machine code, Atari controllers.  
**Gameplay:** Bridge Master, Slys, Manic Miner (Spectrum), Atari round-up, Atari Supergraphics, Atari Supergraphics (Vic 20), Hangman (Oric), Everest (Dragon).  
**Microspedia:** CP/M, part 2.

**Issue 24, August 18-August 24.**  
**Pro-Tests:** I-Maker III, Spectrum Fifth, daisywheels surveyed, Spectrum digital tracer, Laser.  
**Features:** Videotex.  
**Dragon round-up:** Cookie, Egg Farm, Nadom (Spectrum), Sea Lord (BBC), Louisiana (Dragon), The Island (64).  
**Microspedia:** Commodore 64, part 2.

**Issue 25, August 25-August 31.**  
**Pro-Tests:** Electron, Samsis Basic, Oric monitors, Microdrive.  
**Gameplay:** Magic Mountain, Smugglers Cove (Spectrum), Spectrum round-up, Matrix (64), Ninja Warrior (Dragon), Dallas, (Oric), Call to Arms (IBM).  
**Microspedia:** Commodore 64.

**Issue 26, September 1-September 7.**  
**Pro-Tests:** Mustron 68, BCPL, BBC tracer, 80 column Pet, Oric interfaces.  
**Gameplay:** Magic Mountain, Smugglers Cove (Spectrum), Spectrum round-up, Matrix (64), Ninja Warrior (Dragon), Dallas, (Oric), Call to Arms (IBM).  
**Microspedia:** Commodore 64.

**Issue 27, September 8-September 14.**  
**Pro-Tests:** Sharp MZ700, BBC Lisa, Apple editor, IBM mic, ZX81 survey.  
**Gameplay:** Zip-Zap, Zoom (Spectrum), Spectrum round-up, Hoover (Spectrum), Benji Space Rescue (64).  
**Microspedia:** Dragon, part 1.

**Issue 28, September 15-September 21.**  
**Pro-Tests:** Zenith Z100, Snail Graphics, Atari Supergraphics, Newbrain CP/M, IBM mic.  
**Gameplay:** The Witness, Super Scramble, Sits (64), Harrier Attack (Oric), Morocco Grand Prix (Dragon), Pharaoh's Tomb (Spectrum).  
**Microspedia:** Dragon, part 2.

**Issue 29, September 22-September 28.**  
**Pro-Tests:** Portico Miracle, Dragon editor, BBC toolkit, Dragon drives, Apple light pen.  
**Features:** HX20 disassembles, TI transformations.  
**Gameplay:** Gopher, Gloopco, California Gold Rush (64), Oric round-up, Bomb Alley (BBC), Solar General Election (Spectrum).  
**Microspedia:** Dragon, part 3.

**Issue 30, September 29-October 5.**  
**Pro-Tests:** Spectrum Fourth, BBC graphics, Music synthesiser, IBM plotter, Brother daisywheel, Maltron keyboard, Muped.  
**Features:** Genre assembler, Dragon machine code.  
**Gameplay:** River Rescue, Ore Attack (Atari), Zork (64), Knot in 3D, 3D Combat Zone (Spectrum), Moria (Oric), Velnor's Lair (Spectrum).  
**Microspedia:** CP/M part 1.

**Issue 31, October 6-October 12.**  
**Pro-Tests:** Electron, Samsis Basic, Oric monitors, Microdrive.  
**Gameplay:** Magic Mountain, Smugglers Cove (Spectrum), Spectrum round-up, Matrix (64), Ninja Warrior (Dragon), Dallas, (Oric), Call to Arms (IBM).  
**Microspedia:** Commodore 64.

**Issue 32, October 13-October 19.**  
**Pro-Tests:** Zenith Z100, Snail Graphics, Atari Supergraphics, Newbrain CP/M, IBM mic.  
**Gameplay:** The Witness, Super Scramble, Sits (64), Harrier Attack (Oric), Morocco Grand Prix (Dragon), Pharaoh's Tomb (Spectrum).  
**Microspedia:** Dragon, part 2.

**Issue 33, October 20-October 26.**  
**Pro-Tests:** Portico Miracle, Dragon editor, BBC toolkit, Dragon drives, Apple light pen.  
**Features:** HX20 disassembles, TI transformations.  
**Gameplay:** Gopher, Gloopco, California Gold Rush (64), Oric round-up, Bomb Alley (BBC), Solar General Election (Spectrum).  
**Microspedia:** Dragon, part 3.

**Issue 34, October 27-October 31.**  
**Pro-Tests:** Spectrum Fourth, BBC graphics, Music synthesiser, IBM plotter, Brother daisywheel, Maltron keyboard, Muped.  
**Features:** Genre assembler, Dragon machine code.  
**Gameplay:** River Rescue, Ore Attack (Atari), Zork (64), Knot in 3D, 3D Combat Zone (Spectrum), Moria (Oric), Velnor's Lair (Spectrum).  
**Microspedia:** CP/M part 1.



**ORDER FORM**

Any one issue is 75p, additional copies 55p, post & packing inclusive. Overseas readers please add £1 per copy airmail postage. Please allow up to 21 days delivery.

Name ..... Telephone (day).....  
 Street .....  
 Town ..... Post Code.....  
 Please send me ..... issues of PCN, issues no .....  
 I enclose my cheque/PO made payable to Personal Computer News or please debit my credit card: Visa/Access/Amex/Diners  
 Card no ..... Signature .....

Send to: PCN Back Issues Service, 53-55 Frith Street, London W1A 2HG.













Make and Model	Price inc VAT	Capacity	No. of heads	Tracks	Sectoring	Sides and density	Connects to										Distributor
							IEEE	RS232	Apple II	Apple IIc	St. Diagnos	Nubus	Gamma	Other	Others		
<b>8" DISK DRIVES</b>																	
F 320	£2,300	2.4Mb	2	76	Soft	DS, DD										B5	
M 2894	£499	1.6Mb	1	77	Soft	DS, DD										A3	
M 2896	£493	1.6Mb	1	77	Soft	DS, DD										A3	
Megastor 11 DD	£1,133	2Mb	2	77	Soft	DS, DD										V1	
Megastor 11SD	£1,018	1Mb	2	77	Soft	DS, SD										V1	
Megastor 111	£1,121	2Mb	2	77	Soft	DS, DD										V1	
R.M. FDS-2	£3,789	1Mb	2	77	Soft	DS, SD										R3	
Tandy Model 11	£999	486K	1	77	Soft	DS, SD										T1	
Tandy Model 16	£949	1.2Mb	1	77	Soft	DS, DD										T1	
Tandy Model 16	£1,549	2.5Mb	2	77	Soft	DS, DD										T1	

## MODEMS

A modem interfaces a computer and the telephone system so computers can communicate over long distances. It converts data to electrical pulses or sounds that can be sent down the line. A modem can be connected to the line directly or acoustically. A **D** in the connection column represents direct link, while **A** indicates acoustic. The acoustic coupler is like a female telephone handset with a speaker in the coupler opposing the phone's mouthpiece and a microphone opposing the earpiece. A **B** in this column indicates that both methods of attachment are available. **Baud rate** shows the speed with which the data is transmitted.

The modem must be connected to the computer through an interface. The **interface** column lists the main interfaces featured on each model. **Asynchronous** means that data may be transferred at intervals as available or as needed. **Synchronous** data is transmitted at regular intervals. **Simplex** transfers data in one direction, while **Half duplex** can transmit/receive in either direction, but not simultaneously. **Full duplex** transmits and receives information in both directions at once. Some modems can originate a call or start a two-way conversation. **Answer** means they can respond to a call from another computer.

Make and Model	Price inc VAT	Connection	Data Rate (baud)	Interface	Capabilities							Distributor Code	
					Others	Asynchronous	Simplex	Half Duplex	Full Duplex	Originate	Answer		
AD 1223	£287.50	D	1200	RS232									A6
AJ 311	£320	B	300	RS232									A5
AJ 1222	£736	D	1200	RS232									A5
AJ A211	£263	A	300	RS232									A5
AJ 1234	£684	A	1200	RS232									A5
AJ 1256	£684	B	1200	RS232									A5
AM 211	£387	B	300	RS232									A5

## DISTRIBUTORS

**A1** Appropriate Technology, 01-625 5575 **A2** Advent Data Products, Melksham 706289 **A3** Altex Microcomputers Ltd, Reading 791579 **A4** Atari International (UK), South 33344 **A5** Anderson Jacobson Ltd, Slough 25172 **A6** Alpha Data Systems, Ousek 27 66136  
**B1** Bytech, Reading 61031 **B2** British Olivetti, 01-785 6666 **B3** Barron McCann, Biggleswade 316286 **B4** Bencom, SENDATA (UK), 01-940 1386 **B5** Baydel Ltd, Leatherhead 778811 **B6** BASF, 01-388 4200  
**C1** Centronics, 01-581 1011 **C2** Commodore Business Machines, Slough 79292 **C3** Calcomp Ltd, Bracknell 50211 **C4** Crofton Electronics, 01-891 1923 **C5** Canon (UK) Ltd, 01-680 7700 **C6** Cumana, Guildford 503121 **C7** CBI, Reading 792097  
**D1** Datacom, Evesham 3591 **D2** Datacube Ltd, Northampton 22289 **D3** DINGS Ltd, 061-643 0016 **D4** DPG, Weston-super-Mare 415396 **D5** Data Systems Division, Bedford 223889 **D6** Data Efficiency, Hemel Hempstead 63561 **D7** Data Track Technology, New Milton 619650 **D8** Dacom Systems, Milton Keynes 76797  
**E1** Epson (UK), 01-900 0466 **E2** Elcomatic, 041-881 5825 **E3** Eicon, Barhill 81825 **E4** Environmental Equipments Northern Ltd, Nantwich 625115  
**F1** Fastool, Reading 791557  
**G1** Geveke Electronics, Woking 26331 **G2** Gemini Micros, Amersham 28321  
**H1** H&M Computers Ltd, Farnborough 517175 **H2** Hayward Electronic Assoc. Ltd, 01-428 0111  
**I1** Informer Ltd, 01-318 4213 **I2** Intac Data Systems, Rotherham 547176 **I3** ITT Business Systems, Brighton 507111 **I4** ITT Consumer Products, Basildon 3040 **I5** Intelligent Industries, Stratford-upon-Avon 296879

Make and Model	Price inc VAT	Type	Max Pens	Paper Size	Maximum Printing Speed in lps	Interface (V or term con)	Distributor
Bermac 1200/1 Model A	£414	D	1800	RS232			B3
Bermac 1200/1 Model B	£460	D	1800	RS232			B3
CITT CAT	£228	A	300	RS232/V24			D8
CDSV22	£719	D	1200	RS232/V24			D8
DSL2123	£329	D	300/1200	RS232/V24			D8
Sendata 700 Series A	£253	A	300	RS232, 20ma	1		B4
Sendata 700 Series B	£224	A	300	RS232, 20ma	1		B4
Sendata 700 Series C	£309	A	600-1200	RS232, 20ma	1		B4
Sendata 700 Series D	£309	A	75-1200	RS232, 20ma	1		B4
Sendata 700 Series E	£149	A	300-1200	RS232, 20ma	1		B4
Racal 126 LS1	£782	D	2400	V24			R2
Racal MPS 3021	£295	D	300	V24			R2
Racal MPS 1222	£678	D	1200	V24			R2

## PLOTTERS

Plotters use a pen to put graphics or characters on paper under the command of a computer. They are usually one of two types—flatted or drum. A **flatted** holds the paper flat while the pen draws on it in two dimensions. A **drum** plotter turns the paper vertically on a cylinder while the pen moves horizontally. Most plotters can change pens during operation so a variety of colours and line thicknesses are available. **Max pens** indicates the number of pens in operation on or standby. Dimensions of the paper to be used are listed under **paper size**. **Maximum plotting speed** measures the distance in millimetres per sec covered by the pen. **Interfaces** are included in the basic price or come at extra cost.

Make and Model	Price inc VAT	Type	Max Pens	Paper Size	Maximum Printing Speed in lps	Interface (V or term con)	Distributor
Calcomp 81	£3,392	Flat	B	A3	30cm	RS232 or IEEE	C3
DXY 100	£699	Flat	1	A3	7	Centronics	R4
HP 7470A	£1,317	Drum	2	A4	38.1cm	RS232 (IEEE+)	H2
PD4	£585	Flat	1	A4	700mm	(IEEE+)	J2
RY-21	£747.50	Flat	1	A4	200mm	Centronics, (RS232+)	R5
RY-10M2	£1,865	Flat	8	A3	400mm	Centronics, (RS232, IEEE+)	R5
Strobe 100	£662	Drum	1	A4	7.6cm	(RS232, Parallel+)	D6
TRS-80 Pen Plotter	£1,399	Flat	6	A4	6.8cm	RS232	T1
Watanabe WX 4634	£2,515	Flat	2	A3	250mm	(Centronics, RS232, IEEE+)	E4
Watanabe WX 4635	£2,301	Flat	1	A3	250mm	(Centronics, RS232, IEEE+)	E4
Watanabe 4637	£2,862	Flat	2	A3	400mm	(Centronics, RS232, IEEE+)	E4
Watanabe 4638	£2,635	Flat	1	A3	400mm	(Centronics, RS232, IEEE+)	E4
Watanabe WX 4671	£1,129	Flat	1	A3	50mm	Parallel (RS232, IEEE+)	E4
Watanabe 4675	£1,638	Flat	6	A3	50mm	Parallel (RS232, IEEE+)	E4
Watanabe 4731	£1,761	Drum	4	A3	200mm	(Centronics, RS232, IEEE+)	E4

**J1** Jones & Brother, 061-330 6531 **J2** J J Lloyd Instruments, Locksheathe 4221 **J3** JVC, 01-450 2621  
**L1** Lowe Electronics, Matlock 4995  
**M1** Mitsubi & Co Ltd, 01-600 1777 **M2** Modata, Tunbridge Wells 41555 **M3** Mannesmann Tally Ltd, Reading 788711 **M4** Microput, Macclesfield 615394 **M5** Microware, 01-272 6237 **M6** Microtech Leeds, Leeds 679964 **M7** Micro Peripherals Ltd, Basingstoke 3323  
**N1** Newbury Data Recording, Newbury 48864  
**P1** Phoenix Technology, 01-737 3322 **P2** Pete & Pam Computers, Rossendale 227011  
**Q1** Qume (UK) Ltd, Reading 584646  
**R1** Rait Ltd, 01-636 6921 **R2** Riva Terminals, Woking 71001 **R3** Research Machines Ltd, Oxford 249866 **R4** Roland (UK) Ltd, 01-568 4578 **R5** Rikadenki Mitsui Electronics, 01-397 5111  
**S1** Sintron Electronics, Reading 875454 **S2** Soron, 01-930 4214 **S3** Stotron, Coventry 613521 **S4** Systime, Leeds 702211  
**SS** Sinclair Research, Camberley 681666 **SE** Siccard Express, Leicester 374917 **S7** Sharp Electronics, 061-205 2333  
**T1** Tandy Company, Walsall 648118 **T2** Triumph Adler, 01-250 1717 **T3** Technology For Business, 01-837 1271 **T4** Toshiba Office International, Sunbury-on-Thames 85666  
**V1** Viasak, High Wycombe 446333  
**W1** Walters Microsystems Int Ltd, High Wycombe 445175  
**X1** X-Data Ltd, Slough 723331  
**Z1** Zygma Dynamics, Bicester 3361

**REACHES THE CUSTOMERS  
OTHER MICRO MAGAZINES  
CANNOT REACH**  
**CALL: NIC JONES  
AND HIS TEAM  
ON:  
01-323 3211**

## **Classified ad today..... sold next week**

**THIS IS YOUR OPPORTUNITY TO ADVERTISE IN PERSONAL COMPUTER NEWS  
BRITAIN'S NO. 1 MICRO-COMPUTER WEEKLY.  
FOR ONLY 35p PER WORD, YOU CAN RELAY YOUR MESSAGE TO READERS ALL OVER  
THE COUNTRY!**

Write your ad in the boxes below — one word per box and a minimum of 20 words. Write in BLOCK CAPITALS and don't forget to include your name and address or telephone number in the advert. Underline any words required in **bold type**.

Final deadline is ten days before issue date. To ensure that your ad appears in the next issue, fill out the form and send it with your cheque PO straight away!

Cut out this coupon and send with your remittance to:

**MICROSHOP CLASSIFIED, PERSONAL COMPUTER NEWS, 62 OXFORD STREET, LONDON W1A 2HG**

**35p  
per word**

Name.....

Tel .....

Address.....

Please place my advert in PCN for week/s.

Enclose remittance for .....

made payable to Personal Computer News.

(Total = Number of weeks × Number of Boxes × 35p)

			20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
41	42	43	44

Barclaycard/Access No.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**Atari VCS** plus six games cartridges; Space Invaders, Miniature Golf, Basketball, Video Olympics, Air-Sea Battle, Combat. Very good condition, £50. Tel: (Reading) 0734 29028.  
**Synthesiser Yamaha** CS5 full keyboard, interfacing possible with A/D converter as used by Depeche Mode, only £190 now. Tel: Shaun on Newcastle (0632) 732824.

**VIC-20**, C2N cassette, 8K RAM, 3K swap expander, 4 cartridge games, 14 cassette games, 2 books, still boxed, £200 one. Tel: 01-701-1806.

**Intellivision** plus Intellivision 3 cartridges including B17 Bomber, £95 one. Also Jani 5 cartridges including Asteroids and Pacman, £79 one. Tel: Beckenham (Kent) 01-850-2789.  
**Spectrum software**, £3.50 each. Jetpack, Schizoids, AH, Didlums, Cosmos, Firebirds, Zoom, Arcadia, Centipede, Escape, Road Runner, Orbiter, many more. Tel: Phil, Newcastle 761386.

**Apple IIe**, Apple III monitor, stand, 1080 drives with controller, £1,100. Multiplan, E99, Quick file, E39, Printer interface, E79. Under guarantee free games. Tel: 01-555-5559.

**BBC Model B** OS1-2, hardly used, £340. ICL 1501 desktop mini computer and large printer, £300. 33 boxed 5.25in printer mechanisms, £50. Tel: 01-688-8565.

**48K ZX Spectrum**, joystick, tape recorder, MC book, and nearly £200 of best software. Value over £370. Swap for Lynx 96k or CBM64. Tel: Eschen 62785.

**Wanted** Vis-20 MC monitor, programme reference guide. For sale Vic, Hermes, Skramble, Space Phrecks, Introduction to Basic, getting acquainted with your

Vic-20. Tel: 0789 292596.  
**BBC model B** with 1.2OS, Basic II, boxed complete with manual, Acornsoft, A&F program power software, £290 one. Tel: 802 1280 after 5pm.

**Vic-20**, cassette unit, swap expander, monitor cartridge, joystick, books, £100 of software. All boxed as new, £175 one. Tel: Herne Bay 6763.

**RAM-20**, nearly new, plus C2N, 16K RAMpack. Spectravision joystick, 16K Donkey Kong, Jelly Monsters, Chopfiter, Mutant Herd, plus books. Will accept £230 one. Tel: 041-942-4237.

**Sharp MZ-80A**, excellent condition, original packaging, £200+ of software, 80 character kit unfitted, worth altogether £650+. Will accept £450 one. Tel: 01-450-7121 after 6pm.

**Acorn Atom 64k** + G 12K ROM FP ROM, A+F ROM, £160 of software, 2 books, magazines, printer, Interface Sekkosha AP100a manuals, 2000 sheets paper, £400, sell separately. Tel: 0732 845703.

**Atari 400-800** cassettes O'Reilly's Mine, £12. Apple Panic, £12. Airstrike, £10. Tel: Burgess Hill 044 46 42704 after 4.30pm.

**Intellivision** plus sixteen cartridges, Dragonfire, Atlantis, Pitfall, Iron, DD, Shark! Night Stalker, Dungeons and Dragons, worth £410+, accept £150. Tel: 0709 868264.

**Atari 48K**, 40k + cassette + joystick + Basic + lots of software, £130 one. Tel: 0526 21187 after 6pm.

**Swap or Sell** 5 games including Sonic Controlled Car, Matchplay Golf, Operation UGC, all under £5, or swap for any computer, buyer collects. Tel: 01-304 3411.

# Billboard

**Atari 400** + basic + recorder + manuals, 2 joystick + 5 basic programming tapes (worth £80), 9 games including Projector II, Airstrike, Darts, under guarantee, excellent condition, bargain £230. Tel: Ilford 554-1640.

**Vic-20 Software** for sale, 22 games plus joystick, worth over £180. Will sell for £80. Tel: 01-854-3330.

**Atari 800** (48K), boxed, disk drive, cassette recorder, Macro Assembler, 128K RAM, 4 disk drives, controllers, books, other software worth £189, sold cover, £575 one. Tel: 06284 6136.

**Intellivision** with Space Spartans cartridge, £30. Intellivision cartridges from £15 to £10 each, ring for titles (over 20 including B17, Tron, DD etc). Tel: 0703 869775.

**BBC Light Pen**, by RH Electronics complete with software, 1 month old, (11 month guarantee), £40 one. Tel: 0223 243545.

**Atari Software**, Raider, Kickback, £8. Nextstep, £12. Defender, Centipede, £18.50. Filing Manager, Assid, £25. K-Dos, £29. Compiler, £55 + many others. Tel: Ingrebourne 40643 each.

**BBC Model B** OS1-2 OS and wordwise ROM, boxed as new, hardly used, including £300 worth software, and BBC Basic programming book, £355. Tel: Tony, 01-656-1239.

**Sharp MZ 80A** sold cover, software pack plus two games, two months old, £340. Tel: Overton 233 (Lancs).

**48K** as new, original books and software, (worth £75) sell for, £45, one. Tel: 0375-640 443 after 7pm.

**Software**, Unwanted original tapes, disks, cartridges etc. from 50p, all machines, see for list, Heathcote, Lower Britwell Road, Burnham, Bucks. Tel: 0286 282 2375 ext.

**Atari Owners**: Mincor 2049ER ROM, £15. Chess ROM, £11. 16K Adventure Escape from Tramm, £9. Tel: 047464066 Mon-Fri, 10 am to 2pm, (Stephen).

**Com-300B** Excellent condition including tape recorder and software, over 70 programs, built in VDU professional keyboard, plus manual, £250 one. Tel: 021-430 7393.

**Spectrum games**, Ship of Doom, Espionage Island, Golden Apple, 5.25in, £10. Tel: 03632 3714.

**ITT 2020 48K** (compatible Apple II, Autostart 48K, 3 DOS, latest disk drive, Phillips Amber monitor, £550. Tel: 01-421-1188.

**Spectrum 48K** Printer, tape player, (all guaranteed), over £130 worth of software, all worth over £450, asking £290. Tel: Gains 0427 880116 after 5pm.

**16K Z801** six months old, good condition, eight games, tape player, manual, catalogue, packaging, £30. Tel: Tom on 0823 698846, Other Kay Bridgwater, Somerset, T.V. 0142.

**Double disk drives** for sale, complete with PET, interface and cable, any offers. Tel: 021-552 8666 after 4pm.

**Atari 800** six months old, still under guarantee, inc two manuals, plus £90 worth of software, the lot for, £150. Tel: Lee 01-952 6491.

**BBC software** for sale, as new, Acornsoft etc, must sell fast, also books and mags. Tel: Hugh on 01-857 0181 after 5pm.

**£100 Books**, 64K Dynamic RAM, £150. Disk controller £160, VBA memory mapped VDU, £110. Tucson main board complete, professionally built, £70. Tel: Wood, Rugby 69447.

**Commodore 0960** hard Disk Drive, 12 months old, £900. Tel: Guildford 39801.

**Spectrum Software** for sale, Meteoroids, Tel: Hugh on 01-857 0181 after 5pm.

**Video Games**, Atari, Manic Miner, Moon-Goose, Stix, Fruit Machine, Programmable joystick interface. Tel: Tes, Boleyn 736 after 7pm.

**Video Game** beautiful condition, 200 games, owner upgrading, bargain at £75, no offers. Tel: 051-356 4639 after 6pm.

**Sharp MZ-80K** built-in screen, and tape recorder, Basic tapes, manual, Forth tapes, programming book, £250. Software for, £350 one. Tel: 01-455 6641 after 4pm.

**Z801** six months old, excellent condition, plus games, Scramble, Defender etc, complete with manual and all leads, £40. Tel: Maidstone 36197 047thames.

**Microline 80** computer printer, unwanted raffle prize, unused, still boxed. Tel: 01-578 1305.

**Sharp MZ-80K** + £50 of software and books, £295 one. Tel: 0253 403994 (Blackpool).

**Wanted** ZX printer, good condition with manual, mass £25, also £1 per roll of paper from anyone, £ Home, 4 Cord Lane, Easenhall, Rugby, Warks. Tel: Rugby 832468 eyes only.

**Sharp MZ-80K 48K**, excellent condition, software includes Fortran, Algol, Machine Code, Assembler, Five Basics, also Defender, Chess and more, £340 one. Tel: 01-446-0079.

**Atari 2000** with US specifications — never used including, joystick, 5 games cartridges, Basic, only £300. 1200XL, 67K computer above £200. Tel: 579 1057 after 6.30.

**Vic-20 + C2N** cassette player + Super Expander cartridge + joystick, three cassette games, various books and magazines, excellent condition, £120 one, plus carriage. Tel: Plymouth 0752 337905.

**Atari VCS** 26 cartridges, Phoenix, Vanguard, Centipede, Discover extra controllers, worth over £800, sell £330 one, excellent condition, still boxed. Tel: Preston 0772 729435.

**BBC Snapper** Snapper, Meteors, Rocket-Raid, Monsters, Defender, Arcades, Arcade, Action Stage of Riddles, Philosophers, Quest, all original, £5 each. Tel: Southend (0702) 75442 eyes.

**Swap conditions** microscope for Dragon or Centronics printer, 2 eyepieces, 4 objectives, magnification range 25-1250X, Vernier stage controls, complete with accessories. Tel: 01-821 1710 eyes.

**Sharp MZ80A** & J18K, + £30 of software (Kuma), £240 one. Tel: Reigate 44190.

**BBC Acornsoft** Forth tape + book + Discover Forth book, all perfect, £16. (£30+ new), Creative Graphics book, £3. Tel: Southend (0702) 75442 eyes only.

**Exchange 6 channel FM** radio control TX + RX, 4 servos, NI-CAD + charger, plus Glider f1t span, cost £200, all new unused due to disablement, for Dragon £20. Commodor 64, Spect ZX, etc. Tel: 051-355 6564.

**Oric-1 48K** as new + mostly all famous games available and books worth £100, cost me £277, yours for, £150 only. Tel: 01-855 7443.

**Atari 800** owner will swap games on cassettes. Tel: 051-487 8766.

**Apple** computer, graphics monitor, 2 1/2in disc drives with controller, all unused for £675, will sell separate, selection of cards available. Tel: 01-428 3765.

**Atari 800**, 410 recorder, joystick, numerous games, books and mags, £250 one. Tel: Ashwell 046274 2474 (Herts) eyes and weekends.

**Atari 800** computer for sale, many titles at least 50% off list. Tel: Ged on Warrington 31288 ext 231, between 12-12.30pm any Monday.

**Microline Ad** plus Chess + Alien Invaders programs, studies leave, no speed for use, £150. 18 Harewood rd, Time Well, Bristol. Tel: 0272 670096.

**Atari 400 48K**, cassette recorder, joystick, Donkey Kong, Star Raiders, Dig-Dug, Astrochase, Asteroids, Preppie and over, £1000, more of software, £350. Tel: Worthing 42013.

**48K Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

**Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

**Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

**Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

**Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

**Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

**Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

**Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

**Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

**Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

**Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

**Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

**Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

**Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

**Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

**Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

**Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

**Atari 400**, 410 recorder, Basic joystick £800, software, 3 ROMs + £700 cassette games, have to be played to be believed, £250. Tel: 01-599 3982.

## Billboard Buy & Sell Form

To place your Billboard ad, fill in the form on the left, with one word per space, up to a maximum of 24 words. Send the completed form, together with a cheque or postal order for £1.50 made payable to VNU Business Publications, to: **Billboard, Personal Computer News, 62 Oxford Street, London W1A 2HG.** Note that we cannot guarantee that your ad appears in any specific issue, and that we cannot accept ads from commercial organisations of any sort.

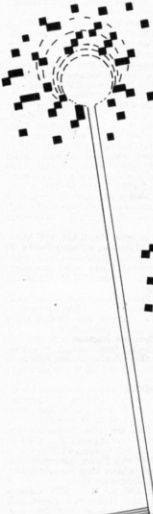
Your name: .....

Address: .....

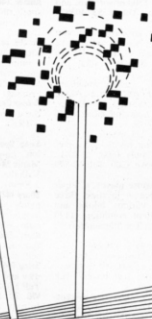
Telephone: .....

# COMING SOON

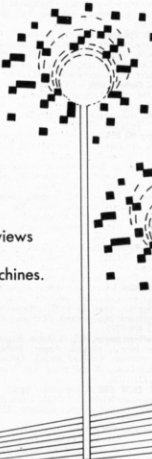
**Second issue of Personal Computer Games  
on sale 28th October**



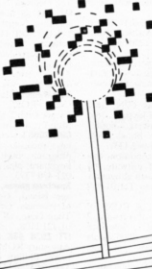
Win £2,000 worth of prizes from Colour Genie in our fabulous Treasure Hunt Competition!!



Read our hardware reviews on the latest "games" machines.



See what the games really look like in our full colour action freeze section!



Don't miss out: Personal Computer Games: on sale at Newsagents from 28th October — only 85p! Order your copy NOW.



**Personal  
Computer**

**G A M E S**

# MICROSHOP

Rates: £10 per single column cm. Minimum size 3 cm. Series discount available. **Mechanical Data:** Column width, 1 column 57mm. 2 colours 118mm, 3 columns 179mm. **Copy Dates:** 10 days prior to publication.

Contact: Christian McCarthy on 01-323 3211.

## SOFTWARE

**ELKAN ELECTRONICS**

**LOOK! LOOK!**

**QUICK-SHOT** deluxe self-centring joystick — DRAGON/TANDY/COLOR ..... £14.95 (£1 p&p)

**New! ELKAN TOP-SHOT** self-centring joystick with interesting features ..... £5.95 (£1 p&p) for Dragon/Tandy/Color Commodore 64 VIC-20 Atari-Texas Instruments (with Interface 2) by pair — p&p in hand.

**NANOS "quick-reference" cards** — easier to use than the manuals:

DRAGON32	£3.95
COMMODORE 64 VIC-20	£3.95
8602 PROCESSOR	£3.95
others (e.g. Apple, Tandy, Sinclair available)	£3.95
DRAGON 5 BYTE on/off indicator	£3.95
DRAGON 5 TALK joystick extender	£3.95

Send cash, cheque, credit card no. to:  
**ELKAN ELECTRONICS, FREETPOST,**  
 11 Bury New Road, Littlewick, Manchester  
 M25 6JZ. Tel: 061-798 7613  
 (i.e. e. for full catalogue)

**LYNX 48K SOFTWARE**

**LARRYBLYTH** — 3D maze game ..... £4.75

**REVERSALS** — our version of traditional board game in last machine code ..... £4.75

**CHANCELLOR** — run UK economy for 10 years ..... £4.75

**SPACE TREK** — Zap the Klingons ..... £4.75

**THE WORM** — our best yet... guide Wilberforce to the flowers, you will not want to stop ..... £5.95

**DISASSEMBLER** — examine machine code programs in standard Z80 memories ..... £4.75

Cheque/PO to:  
**QUAZAR COMPUTING**  
 Dept PCN, 29 Western Road,  
 Newick, Sussex.

Other programs also available, send for details

**Programs Wanted**

We require quality programs for most micros.  
 We pay cash fees, royalties and distribute in the UK, USA, and Europe.

Phone: (0256) 02561  
 or write to:  
**DREAM SOFTWARE**  
 P.O. Box 64, Basingstoke, Hants, RG21 2LB  
 (Please enclose return postage if you wish your cassette returned)

**WANTED**

**PERSONAL COMPUTERS**  
 all models bought for cash

Morgan Camera Company  
 160 Tottenham Court Road,  
 London W1. Tel: 01-388 2562

**DATA CASSETTE DUPLICATING**  
 for SPECTRUM, BBC, ELECTRON,  
 ZX81 & MZ80K

Swiss quality cassettes with high grade tape. Only £5 mastering charge. Minimum quantity 20 pieces. Very competitive prices. Fast turnaround.

For more details write or phone:  
**DEDICATED MICROPROCESSORS LTD.,**  
 Unit B2, Regeneration House, School Road, North  
 Acton, London NW10 6TD.  
 Tel: 01-965 2841

**64 BUSINESS USERS**

Hardware including super Epson printers at low prices and lots of good software in stock, e.g. Calc Result, Accounts Packages, Visawrite and Spell, Codewriter, Assembler, Monitor, Programming Utilities and WAIT FOR IT — CENTRONICS INTERFACES.

**THE COMPUTER CENTRE**  
 17 Bridge Street, Leighton Buzzard, Beds.  
 Tel: (0525 376622 & 382504)

**POOLS PREVISION**

**"POOLSWINNER"**

The most sophisticated Pools Prevision Aid available. Gives probabilities of score draws, draws, homes or away, based on two databases holding over 20,000 matches included.

The databases are automatically updated as results are entered. This year's results are supplied with the package.

Can be used in simple mode, or with parameter adjustments to develop your own unique forecast method.

Fully documented, available now for Apple, Spectrum (48K), Dragon, ZX81 (16K), Commodore 64, BBC, etc. (others — please enquire).  
**£15.95 (inc. tax)**

**"POOLSDATA"**

Complete record of all English Football League matches 1978-83. Team scores and dates of 10,000 matches held in simple format, ready for your analysis. Starter analysis programs, and full documentation included. Available for Apple, Spectrum, ZX81, Dragon, Commodore etc.

5 years Data £15.80 2 years Data £7.50

**SELEC SOFTWARE (PCN)**  
 37 Conventer Lane,  
 Cheddle, Cheshire  
 061-428 7258

**ADVENTUREMANIA**

For the basic/TK-99/4A

A fascinating graphic adventure set in London. You must find the hidden instruction to discover your ultimate quest, but don't get caught.

**Features:** mazes, dungeons, gambling casinos and more.

Send PO cheque for £5.95 to:  
**INTRIGUE SOFTWARE**  
 The Web  
 Cranbrook Rd  
 Tenterden  
 Kent TN30 6UJ  
 Trade enquiries welcome

**COMPUTER RETAILERS**

**MICRODEALER UK**  
**IS THE UK's No. 1**

**SOFTWARE SPECIALIST DISTRIBUTOR**

The Microdealer UK Software Portfolio contains a staggering 27 of the UK Top 30 best selling programs. Microdealer UK is open 7 days a week and sells advice, experience, knowledge and software.

Remember, make Microdealer UK your first call for software.

**RING:**  
**305 0521**  
**NOW!**

**EXCALIBUR SOFT:**  
 CO-ALIGNED COMPUTING

Presents 'Survival' for unexpanded VIC 20s  
 5 exciting games on one cassette  
**Bomber, Mazeman, Voyager,**  
**Terminal Termites, Rings of Titan.**

Only £5.99 inc. p&p

ALSO see AVALON COMPUTING's unbeatable range of characterising software titles for ALL leading micros. Send a large sae for a comprehensive catalogue.

**AVALON COMPUTING**  
 14 Cliff Road, Hornsea,  
 North Humberside, HU18 1LL.  
**TEL: 04012-8113**

By arrangement with Anthony Ashpial

**THE TYPING MASTER**

Is now available for your **NewBrain**. This program takes you from two-finger pecking through to over 30 words per minute. A must at only £15.

Save your **NewBrain** hi-res graphics on paper with **PRINTER GRAPHICS**. Routines for Epson MX, RX & FX, CP80, Microline, FACIT, Walters & STAR printers. £6 each.

Work out your savings, loans and mortgage using the **MORTGAGE** program. Full instructions can be viewed at the press of a key. Only £5.

Interface your **NewBrain** to a Centronics printer using

**TYEPRO**  
**Centronics interface**

Switchable from 150 to 19200 Baud and suitable for Epsons, CP80, Microline, NEC & most other printers, only £49.95.

**G.F.G. Microsystems**, tel: (0223) 315120,  
 36 Armitage Way, CAMBRIDGE CB4 2UE.  
 All prices include VAT, P&P.

For All Your Micro Needs

**MICROWAY**

Computer Centre  
 39, High Street, Rainham, Kent.  
 Tel: (0634) 376702

Oric 48K £40 Software	£139.95
Commodore 64	£229.00
Dragon 32	£189.00
Dragon Disc Drive and Controller	£275.00
BBC Model B	£399.00
Acorn Single Disk Drive	£265.00
Disc Interface (inc I/O)	£99.00
Sinclair Cumans Disc Drive CS50A	£244.95
Spectrum 48K	£129.95

+ Full range of software for all makes of micro.  
 + Microvitic monitors + Printers: CP80 £332.35  
 + many others RX80 £332.35

HHTiger Business Computer  
 Loony Larry ..... £3,214.00

CREDIT FACILITIES NOW AVAILABLE

**R.C.S.**

**Software for the Sharp MZ 80A**

Crazy Car	£3.50
Shoot Out	£3.00
Two Way Attack	£3.00
Missile Attack	£3.00
Maths Solver One	£3.00
Loony Larry	£3.00

More programmes under way.

Buy any programme and get Rock Music Quiz free.

Cheques and Postal Orders to  
**RCS**  
 59 Arkwright Walk  
 The Meadows  
 NOTTINGHAM NG2 2HW  
 Send SAE for details.

# PETTIGREWS DIARY

from  
**SHARDS**  
software



Epic three part adventure with comprehensive features making it ideal family entertainment. Solve the mystery of the diary before time runs out! You start in the serene English countryside, then travel through the bustling London streets to further adventures across Europe, with a thrilling climax in Israel. The most feature-packed adventure yet for the Dragon! With hi-res graphics and text. Only £7.95

## TURBO CHARGE YOUR ZX 81!

with our  
**ZX 81 — FORTH ROM**  
with multi-tasking

Replaces your basic ROM to give you a totally new system. The unique screen editor allows you to edit programmes while other programmes are executing. Runs more than ten tasks at once. Schedule tasks to run from 50 times per second to once a year. Ideal for control purposes. Uses all ASCII character and restores the keyboard to normal operation. It contains a real-time clock and a large number of 32-bit words support the ZX printer. Allows machine code definition and needs at least 2K of memory. Supports 16K, 32K, and 64K Ram-Pack. Three times faster than fig-FORTH, but fig compatible. Available as a "fit yourself EPROM", with an extensive manual for £25 + VAT. Some ready-converted ZX81's available. Floating point extension ROM — out soon!

### Coming Soon!

FORTH-I/O Cartridge for Spectrum £59 + VAT. Ask for details

**AND THE OLD FAVOURITE:**  
Nass-FORTH NASCOM £25 + VAT  
Pet-FORTH for Pet from £25 + VAT

### DAVID HUSBAND

2 Gorleston Road  
**BRANKSOME**  
Poole BH12 1NW  
Tel: 0202-764724

# GAME MACHINE



£7.95

### THE FABULOUS WANDA AND THE SECRET OF LIFE, THE UNIVERSE AND EVERYTHING

for COMMODORE 64

An adult fantasy game with Arcade Action

You are travelling far from home looking for good times around the Universe, when you are intercepted by the evil Brutus of the Federation. Brutus forces you to go and seek the Secret of Life, the Universe and Everything - known only to the Fabulous Wanda, a hostess in the Spaced Out Inn in Highsville on the planet COPUS. You are teleported down to Highsville where the Customs man demands money for Teleport Tax. There is a video game in the Terminal with 3 credits left.

Now you are on your own and you must decide how to proceed to Highville Mainstreet to find the various establishments to enter and .....

### OGLES for BBC/B

Designed with people of all ages in mind this programme provides an aid to learn and match colours as well as being very entertaining. Not only have colours to be matched in sequence but co-ordination skills can be developed by moving the correct coloured OGLE to a match pattern displayed on the screen. Interest and amusement are provided by you as Gordon having to control your pet dog. Flash by guiding him to collect the matching OGLE, carry it back and to drop it at the correct position. There are two levels of play. An easy level for the younger person. A professional level for the older person with play against the clock and Hall of Fame.

### OGLE COMPETITIONS ARE FUN!

£5.95

Please add 50p to cover post and packing.

I enclose a cheque P.O. payable to GAMES MACHINE LTD. for £

or debit my Access/Barclaycard account no.

Signature

NAME

ADDRESS



	QTY.	£
WANDA		
BARRELDROP		
EGBERT		
SUPERSNAILS		
OGLES		
ARITHMETIC		
TOTAL		

SEND TO:

**GAMES MACHINE LTD.,**  
**FREETPOST,**  
**STEVENAGE,**  
**HERTS SG1 2ZH.**

AVAILABLE AT ALL SPECTRUM SHOPS, HMV, SELFRIDGES, JOHN MENZIES, LEISURE ZONE AND ALL GOOD COMPUTER SHOPS.

STAND  
109  
NORTHERN  
COMPUTER  
EXHIBITION  
NOVEMBER  
24-28

### BARRELDROP! for 48K SPECTRUM

Poor Gordon! His drainpipes are blocked again and the only way to clear them is to drop barrels down them. Gordon stands on the top of his roof with 5 barrels. When the game starts he'll roll one down the roof. Press **SPACE** to drop it through the roof accurately into the centre of a drainpipe and you'll score the number of points in the pipe, which will start to flash, and Gordon will get the barrel back for another go. The barrel will be lost if the drop is inaccurate, or into a pipe already filled, but - Flash the dog is on hand! If you know you're going to lose the barrel and you can see Flash peeping out from the bottom-right corner, press **D** and Flash will save it! Once you clean all 5 pipes, you will get a bonus, but there's a surprise in store before you get the rest of pipes to fill .....

£5.95

### SUPERSNAILS for 16K or 48K SPECTRUM

Snails specially imported from West Africa are being kept in Dr. Van Winklehoff's laboratory for genetic experiments. The Doctor has turned them into a super-breed of snail who now leave behind a trail of super glue that will trap any snail touching it. Two of the snails, continually moving and controlled by the players, escape from their pens into the laboratory. Unfortunately, only one of the snails can escape from here into the outside world without raising the alarm. You must therefore trap your opponent and then try to escape through the small door which will then appear.

Features:-  
\* Fast Action - 100% Machine Code  
\* Nine levels of difficulty  
\* Keyboard or Joystick Control

£5.95

### EGBERT

for COMMODORE 64

A fast Arcade Action Game for all the family to play.

Written in 100% Machine Code for super-fast action!

Egbert works on the production line at LEYSFACE

It was a comfortable life until the invasion of the TEBBITTES

from the planet TOR. Egbert's union has been exterminated and the Tebbites have left their

deadly Pets running wild in the workplace. As if that wasn't enough, the evil invaders have forced Egbert to

take care of an Egg - damaging the Egg will have fatal consequences for poor Egbert. Egbert is now on

pieceswork - can he earn a decent wage? Can he even survive? **WARNING!** You may get an ulcer by playing this game.

**SIX LEVELS OF SKILL ANYBODY WHO CAN DO LEVEL 6 SHOULD WRITE AND LET US KNOW!**

£5.95

ARITHMETIC FUN-TIME for T109

Elementary addition, subtraction, multiplication and division exercises providing valuable practice and drill for young children who are developing their basic mathematical skills.

Uses colour graphics and sounds to give a good presentation with the sums appearing in large letters on a blackboard.

The Computer plays back sums which the child has difficulty with showing the child the correct solutions. Uses the basic T109 console.

£5.95

Games Machine Ltd., Business & Technology Centre, Bessmer Drive, Stevenage, Herts. SG1 2DX.

Telephone: (0438) 316561.

# · VALUE · APPLE · VALUE ·

## BASE UNITS



100%  
APPLE  
COMPATIBLE  
**£349.00**  
+£52.35 VAT

BASE 64A compatible with Apple cards and software. RAM based system control program, 64K on board memory, expandable to 192K. MINI WRITER on board in RAM. 24K system memory. Tiny assembler with assembly and disassembly function. Upper and lower case characters. Function commands on keyboard. Numerical and cursor keypad. Can load 140K diskette program to 192K user RAM. Staggering value!

**\*\*Phone for part exchange quote on your existing personal computer\*\***

## MONITORS



**£75.00** +£11.25 VAT

12" Green 18 Mhz monitor in elegant plastic case.

## APPLE DRIVE ADD-ONS

### DISK INTERFACE CPA 6

**£47.90** +£7.19 VAT

To connect Apple or compatible drive

### DISK DRIVE CPA 14

**£176.00** +£26.25 VAT

Top quality Japanese slimline drive with cable.

## APPLE CARD ADD-ONS

### 80 COLUMN CARD CPA 4

**£57.50** +£8.62 VAT

80 characters by 24 lines with true decoders. 7 x 9 character resolution compatible with BASIC, PASCAL and CP/M. Modem compatible.

### Z80 CARD CPA 3

**£47.99** +£7.19 VAT

Adds a Z80 processor to your Apple. Under CP/M, you can add COBOL, FORTRAN or BASIC compiler and assembly language to your II plus and run CP/M packages such as Wordstar and business software.

### 128K RAM CARD CPA 20

**£199.00** +£29.85 VAT

Enables user to load 142K program or use as a fast access disk.

### 16K RAM LANGUAGE CARD CPA1

**£57.50** +£8.62 VAT

Expands the internal memory of your II to 64K and memory capacity available to Z80 card users from 44K to 56K. Available to load integer BASIC under DOS 3.3.

### PAL CARD CPA 7

**£79.00** +£11.85 VAT

Display your II plus colour text and graphics on your home television

### PRINTER INTERFACE CARD CPA 9

**£38.32** +£5.75 VAT

Parallel printer interface.

### RS 232 CARD CPA 12

**£57.50** +£8.62 VAT

Permits basic control of high speed printers and plotters. Programs easily with switch selected preset for speed, line length, auto line feed and carriage return delay. Handles half duplex communications from 75 to 19200 baud. EIA RS 232 C or 20 mA current loop.

## PRINTERS



**£229.00** +£34.35 VAT

CP80 Matrix Printer. 80 cps, bidirectional logic seeking 80 column. Friction and adjustable tractor feed. Hi-res and black graphics. True decoders. Switchable italic print. Auto underline.

## TURKEY OFFER

Base 64 unit with monitor, two slim line disk drives and disk controller for

**£749.00** +£112.35 VAT

Base 64 unit with monitor, two slim line disk drives and controller, Z80 card and 80 column card, CP 80 printer and controller

**£1108.00** +£166.20 VAT

## TO ORDER:

Access and Barclaycard accepted  
Send exact amount including 15% VAT  
plus £7.00 carriage and insurance,  
quoting part numbers, to:

# · WOLFCROWN ·

Alphasoft Limited · 101 Jermyn Street · London SW1Y 6EE · Telephone: 01-930 1991

## VIDEO GALAXY

NO. 1 FOR HOME COMPUTERS AND SOFTWARE

Commodore 64 only £199.95  
Dragon only £164.95  
Vic-20 only £133.95  
Spectrum only £98.95  
Spectrum 48K £127.95

100s of games, books  
and accessories  
available for all  
popular home computers  
including BBC.

VIDEO GALAXY 293 CHISWICK HIGH ROAD LONDON W4

Tel: 01-994 4947

## Software

### FOOTBALL POOLS

Professor Frank George's Football Pools Forecasting system is now available for the:

#### COMMODORE 64

as well as: Apple II, Pet, Video Game, TRS-80, Spectrum, ZX81, BBC 'B', NewBrain, Sharp MZ80K, Sharp MZ80A.

Also available: POOLPERM which calculates perms according to stake and number of matches covered.

Write to: Bureau of Information Science, Commerce House, High Street, Chalfont St. Giles, Bucks.

### MICROSHOP

CALL  
CHRISTIAN MCCARTHY  
ON  
**01-636 6890**

By arrangement with Anthony Ashtal

**THE TYPING MASTER** is now available for your new brain. This programme takes you from two-finger packing through to over 30 words per minute. A must at only £16.

Save your own brain - hire graphics on paper with Printa Graphics. Routines for Epson MX 80 FX & SX, CP80 microline, fact, Writers and Star printers. £8 each. Work out your savings, loans and mortgage using the mortgage programme, full instructions can be viewed at the press of a key. Only £5.

Interface your new brain to a Centronics printer using **TYPEPO** Centronics Interface. Switchable from 150 to 19,200 baud and suitable for Epson, CP80, microline, and NEC and most other printers. Only £49.95.

**GFQ** microsystems, 38 Amalgam Way, Kings hedge, Cambridge CB4 2YE. Tel: 0223 315 120.

## MICRO CHIP POSTER

40 x 50cm full colour poster featuring ultra high mag picture of Motorola mc68000 16-bit microchip in die form.

Available now. Send cheque/PO for £1.95 inc P&P + VAT to:

**CLIMAX COMPUTER SYSTEMS LTD**  
17a Broad Street, South Molton,  
Devon EX3 6AQ

## HARDWARE

### DRAGON/ATOM/ORIC-1 ADD LOW-COST I/O POWER WITH A VIA BOARD

Drive extra I/O devices, from LEDs & switches to extra peripherals. Link 2 micros for data program transfer, spool listing to a second micro to print/save etc. (see TEV-LINK below).

**HARDWARE:** 6502 VIA provides 16 I/O lines - control, serial port 2 timers, interrupt register, I/O voltage & interrupt lines taken to 20-way D25 plug for easy connection to peripherals etc. Connectors available for Dragon, Atom. The Board may be upgraded to most other 6502/6508 micros, and may be shared between micro's by changing the plug-in connector.

**SOFTWARE:** TEV-LINK package provides 2-machine parallel link (2 Boards needed) overall speed about 8K DATA bytes-second with error checking.

A PRINT SPOOLER is included (only 1 Board needed) connect printer card to VIA board on receiving micro and use normal LIST/PRINT etc.  
Assembled board + Atom connector £16.50  
Assembled board + Dragon connector £18.75  
Atom connector £4.00, Dragon connector £6.00

**OTHER SOFTWARE:**  
GAVE QUEST: Underlog and quest for the ring of power. Dragon/Atom/Oric/cassette £2.30  
TEV-D3 KINGDOM: A real-time quest for magic powers (and treasure). Oric £5.75

**T.M.L. DATABASE**  
A flexible general purpose data filing and retrieval program with an auto-reminder feature for birthdays, appointments, etc. 100% machine code program.

MAIL ORDER ONLY.  
SEND FOR LISTS/DETAILS

All prices fully inclusive of VAT, P.P. etc.  
Toward Microtech Ltd, (Dept PCN)  
403 Dallow Road, Luton, LU1 1UL.  
Tel. (0582) 418906

TIDY UP THOSE WIRES WITH A  
**Compuprint Computer Stand**

The ideal answer to keeping your computer tidy. Takes most popular microcomputers including VIC20, Commodore 64, Dragon, Sinclair etc.

**COMPUPRINT COMPUTER STAND**

A quality product specially made for Compuprint by a leading plastics fabricator.

Made from a tough acrylic material in a dark smoked effect colour the stand is both highly functional and attractive.

The stand holds the central processor unit, allowing free access to all ports, a monitor and has two spaces to hold either cassette decks or disc drives.

The ample space underneath the monitor holds the assorted wires, leads and power units that accompany smaller computers.

Order your stand in a handy self assembly flat pack direct from the manufacturers for only £19.95 (inc. VAT) plus £3.00 postage.

**JRDPLASTICSLTD** Buddle Industrial Estate, Wallsend,  
Tyne and Wear NE28 6DL Tel: 0632 620033

**SPECTRUM  
RAM UPGRADE  
16K-48K**

**A GREAT NEW DEAL!**  
£20.99

EASY TO FIT.  
CHIPS JUST  
PLUG IN.  
NO SOLDERING.  
SENT WITHIN 10  
DAYS

INCL.  
VAT,  
P. & P.

ISSUE TWO MACHINES ONLY  
(BLUE KEYS)  
S.A.E. for details,  
please.

**DISPLAY INSTRUCTION SHEET**

Get the best possible results from your Spectrum. Deals with yellowish white, wobbling colours etc. Send £1 plus Stamped Addressed Envelope

MAIL ORDERS ONLY. Cheques/P.O. to:  
**FOUNTAIN COMPUTERS LIMITED**  
Bishops Court,  
Bishopstoke,  
EASTLEIGH  
Hants. SO5 8PE  
(0703) 616505

SORRY, NO OVERSEAS  
ORDERS ACCEPTED  
(including BPO, Channel  
Islands and Eire).

**COMPUTER  
CONSUMABLES**  
QUALITY DISKS AT  
COMPETITIVE PRICES

Machine	PHONE — POULENCE	Price per box 10
Commodore Pet		From £20.00
Tandy Osborne I		From £20.00
Apple II		£20.00
Apple III		£21.00
Olivetti M20		£25.00
IBM P. C.		Single sided £21.00
		Double sided £25.00
Sirius		Single sided £24.00
		Double sided £33.00

Prices are exclusive of V.A.T.

Postage & Packaging included in price.

01-691 7120

**Lin Kup  
CONBLOCK**



This miniature mains connector, 150 by 75.5 by 21.5mm, including plugs, gets rid of all the lead spaghetti usually found behind micro systems.

Approved to B.S. 5733 it incorporates the latest technology:

**Printed circuit distribution  
Individual cable strain relief  
Shuttered socket entry  
Neon power indication**

Enabling four units to be safely and neatly powered from one 13 AMP socket.

**Price inclusive of four plugs, VAT, p&p £7.50**

Send cheque/P. Os to:

**Lin Kup, Transport House  
Severn Square, Newtown  
Powys SY16 2AF**

**LOOK — COMPUTER  
STATIONERY**

SMALL OR LARGE QUANTITIES AVAILABLE  
Continuous feeding paper — music note or plain. 500, 1000, 2000 sheet  
Continuous labels — large range of sizes in packages of 500-5000,  
larger quantities available.

Continuous envelopes, Clearing kits  
Store your work safely in one of our printed binders.  
Catalogue on request. Speedy service

**HCL COMPUTER  
SUPPLIES**

19 GREENLANDS ROAD, KEMING,  
SEVENOAKS, KENT  
TEL. DTFORD (09582) 2918  
THE No 1 IN MAIL ORDER

Shops

**Computerama**

**TORCH Z80 DISC PACK**  
inc £1,000 of software  
**ONLY £720 + VAT carr free**  
**ADVANCED USER GUIDE**  
**FORD BBC**  
**ONLY £12.95 + £2 carr**

**BBC \* SPECTRUM \* COMMODORE\***  
**& ALL LEADING MICRO'S**

59 FOREGATE ST.  
STAFFORD  
41899

STOKE-ON-TRENT  
MARKET SQUARE ARCADE  
HANLEY  
S81020



# MICROSHOP

## Accessories

**DELTA 14 HANDSETS FOR THE BBC**  
Used by years by GAT TABASE, these high specification handsets have 14 push-buttons to take the strain off of your keyboard. The DELTA 14 comes in two parts. One handset will plug into the Ad to give analogue spring return joystick plus three button functions. The second part of the DELTA 14B1 adaptor box which connects the 15-way D' to the user port. This gives 12 buttons on a 4 x 3 matrix. The eighth line selects a second joystick which can be plugged into the adaptor box.  
**New, available now** - Program to convert keyboard-played games to run on the joystick and handset buttons.  
**DELTA 14B JOYSTICK HANDSET FOR BBC £12.95**  
**DELTA 14B1 ADAPTOR BOX AND CABLE £3.95**  
**CONVERSION PROGRAM CASSETTE £3.95**  
**CONVERSION PROGRAM DISK £3.95**

## DIRECT FROM OUR FACTORY



**IN KIT FORM** kit contains 1 switched joystick assembly, 2 moulded case halves, 1 button, 1 5m 50cm + screen cable, living screws... **£4.50 per kit**  
**READY BUILT** with 9-way D' socket - suit Atari or Vic 20... **£3.95 each**  
**SPECTRUM PROGRAMMABLE INTERFACE** - to enable above joystick to work on the SPECTRUM. Will convert any ways to joystick directions. Complete with program tape... **£24.90**  
10 connectors 9-way female plug or 15-way male plug complete with... **£1.75**  
Dip plug 5-way 240 deg... **50p**  
**AERIAL SPLITTER SWITCHES** (Saves unplugging T.V. serial to connect computer)... **£2.50**

Cheque or PO with order. Prices quoted INCLUDE VAT. 1st Class Post. 7 day money back  
**VOLTMACE LTD., PARK DRIVE, BALDOCK, HERTS.**  
Callers welcome Monday to Friday. Telephone: (0462) 894410



# ZX OWNERS

## BANISH LOADING PROBLEMS

Send S.A.E. for Leaflet.  
STATE ZX81 or SPECTRUM.

**ELINCA PRODUCTS LTD.**  
Lyon Works, Capel Street,  
Sheffield 6. (tel 0742 339774)

for only

**£14.99**  
Inc. VAT - Post FREE



## Insurance

### Insure your computer

Impact damage, fire, theft and transit cover for all your computer equipment.

**£1 to £1500**  
Cover £8 p.a. with £10 excess

**£1501 to £2500**  
Cover £16 p.a. with £15 excess

**£2501 to £8000**  
Cover £16 p.a. with £25 excess

**£8001 to £10000**  
Cover £20 p.a. with £25 excess

Write or telephone today for further details

**KGJ Insurance Brokers (Stourbridge) Limited**  
6 Hagley Road, Stourbridge West Midlands  
DY8 1QK. Tel: Stourbridge (STD code 03843)  
5333/2545/77391

## Microshop Classified

- **COMMODORE 64 WORD PROCESSOR.** TEXTPRO. Powerful program, many facilities, comprehensive documentation. Super value - cassette £6.95, disk £9.45. Fully compiled disk version £10.45. Fast delivery by first class mail. Send cheque/PO to: A&C Software, 51 Ashtree Rd., Triviale, W. Midlands B69 2HD.
- **TIP94A PERSONAL RECORDING** program in cassette form, store names & other details on tape. Send £10 to H.A. Said, 74 Selwyn Court, Aylesbury, Bucks HP21 7EQ.
- **GENIE 48K, 3008 CPU** with numeric keypad, lower case, plus 3013 expansion box, RS232, Disc controller, twin 35 track Shugart drives, cables manual, superb software, DOS & utilities, excellent condition, £650 the lot, 04427/5702 evenings.

## Books

### BOOK BARGAINS - BARGAIN BOOKS BARGAIN BOOKS FOR POPULAR MICROS

That really show you how to get the most out of your computer.

**SPECTRUM PROGRAM 1** publishers RRP ~~£6.95~~ **now for £3.95**  
182 pages, 52 programs and full description of how to run them. Structure, mostly self-study.  
ISBN 0715617044

**VIC PROGRAM 1** publishers RRP ~~£6.95~~ **now for £3.95**  
182 pages, 52 programs and full description of how to run them. Structure, mostly self-study.  
ISBN 0715617060

**NEW USING COMMODORE 64** publishers RRP ~~£6.95~~ **now for £3.95**  
Not from the press October publication. Starts with BASIC, moves through machine code - considered in great detail. Graphics, found peripherals to depth both at the heart of the machine, appendices, Basic, machine code and machine code assemblies/dissassemblies listings. A must for anyone who wants to learn about their computer.  
ISBN 0715617147

All the above are free of P&P (UK only). Offer closes 30th November 1985.

State titles required. Cheques or POs.

### JUST-ED

59 St Marys Road, Weybridge, Surrey, KT13 9TZ  
Please print name and address in block capitals.  
Allow for cheque clearance and postage.  
P.S. 100% of other titles for all popular micros, business or general. Free of P&P plus RRP.  
Send for free list. State machine type.

● **Can You Write?** One of Britain's largest publishers is planning a new series of computer books. If you could write about microcomputing, send a letter explaining which area of microcomputing interest you to the address below. Some exciting and lucrative book contracts are now on offer. Box NJC, 4 Little Essex Street, London WC2.

## Services

Real dealer, my name is Simon Stable. I specialise in direct data duplicating for the following cassette-based micros: BBC A&B, Spectrum, Electron, Lynx, Oric 1 and Omega 2. Disc copying for BBC 40/80 track. Don't make printed labels to order - blanks. Blank cassettes.

**FAST TURNOVER - 08692 2831 - COMPETITIVE PRICES**  
We are the new Supplier for Chalfont/Edgware Programs whose new mail order address is: Freeport O.F. Chalfont St. Giles, 20 Wiltonville Way, Hemel Hempstead, Herts. SG9 9JY. Simon Stable.  
Phone: 0462 894410. Fax: 0462 894411.  
46 WEST END, LAUNTON, OXON OX60 612

## SINCLAIR OWNERS READ THIS FROM

You've probably heard about MACHINE CODED PROGRAMS and thought "so what? how can they help me?" Well now you can find out and taste the very real difference by purchasing our latest MACHINE CODED programs. These emulate features of the most modern professional computers (112 bytes writing machine coded programs for IBM, ICL, UNIVAC and Sinclair means we know what we're talking about).

## FINANCE MANAGER

is a powerful and flexible MENU DRIVEN program for practically all domestic and business accounting applications. MACHINE CODED has enabled us to produce the very latest in professional screen presentation and editing facilities.

Great care has been taken to make FINANCE MANAGER extremely easy to use yet the facilities are extensive and comparable to those of software packages for microcomputers costing many thousands of pounds.

- FINANCE MANAGER's main facilities include:
- **AUTOMATIC DOUBLE ENTRY** - for up to 25 to 25 separate accounts with running totals
  - **ANALYSIS** - by user-defined transaction descriptions and/or date
  - **STANDING ORDERS** - added, applied and removed by date or at regular intervals
  - **BALANCE** - all account balances can be listed at any user-defined date
  - **NEW TRANSACTION MARKER** - differentiates between old and new entries
  - **PAGE COMMAND** - scroll back and forth through all the accounts
  - **RECONCILIATION** - enables the user to check all items against statements
  - **FULL SCREEN PRESENTATION** - see it as it happens when you enter, amend or delete
  - **SPEED** - this program is very, very fast
  - **PRINT** - print screen or file, block move, TAB, delete and insert in line, automatic insert, date change, etc.
- APPLICATIONS: domestic and business accounts, specific and general ledgers, financial budgeting and planning.

## ADDRESS MANAGER . . .

Works on the 16K and 48K Spectrum, in 48K it stores, file, select and retrieve over 400 full addresses over 1500 individual names; Dynamic Memory Management and compression techniques makes all this possible and there's a lot more!

- **FULL SCREEN INPUT and EDITING** - see it as it happens with insert, delete and TAB Commands
  - **MULTIPLE INDEXING** - 3 way user-defined index enables you to define, catalogue, select and print entries as needed, (essential for the more sophisticated applications.)
  - **INSTANT RESPONSE** - yes, this program is very very fast
  - **SUPER FRIENDLY** - crash-proof, extremely easy to use and efficient in a way that BASIC can never be.
- MANY USES**
- **AT HOME** - (storing addresses, printing out Xmas Card lists etc.)
  - **AT WORK** - for mail-order work, internal telephone directory, sorting customers into types, areas, size . . . you choose.
  - **CLUBS** - print-out members list, sort different categories etc.

## SPECTRUM CHESS Dare you face The Turk

The original Turk was an eighteenth century automaton, a life-size mechanical figure resident in Turkish costume and scuffed behind a wicker cabinet on which a chess board and pieces were placed.

OCF now offer you the twentieth century equivalent of that Turk - a chess-playing computer program.

The Turk challenges you to a game of chess!

- MANY OPTIONS INCLUDE:**
- 6 LEVELS OF DIFFICULTY
  - DEMONSTRATION MODE
  - BOARD EDITOR
  - GAMES PRINT-OUT FACILITY
  - BLITZ CHESS AGAINST THE CLOCK
  - TWO PLAYER MODE
  - UNFINISHED GAMES CAN BE STORED
  - RECOMMENDED BY THE SPECTRUM MAGAZINE
- FULL INSTRUCTIONS PROVIDED**



Post order to: Oxford Computer Publishing, 44 High Street, Chalfont St Peter, Buckinghamshire

Please name: FINANCE MANAGER at £8.95 £3 Spectrum only.

ADDRESS MANAGER at £8.95 each.  Spectrum only.

CHESS THE TURK at £8.95 each.  Spectrum only.

MACHINE CODE TEST TOOL at £9.95 each.

Send cheque, postal order or ACCESS No. to above address. Or telephone order with ACCESS No. to 07531 888866.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

POSTCODE \_\_\_\_\_

CITY \_\_\_\_\_

Available from selected branches of

**BOOTS & W H SMITHS**





## Laughline result

Another Laughline contest has reached the stage where we name the winner.

It's been another full postbag and the number of things you can read into a man inside a printer silencer leaves us lost for words. So here are some of yours. 'PC 'N quiet at last,' was the suggestion from David North of Durham. Simon Williams, of Sheepwash, Devon, wrote: 'And in next week's "Indoor Naturalist" I shall be

using this easily-constructed hide as part of my study of the Private Life of the Matrix Printer.'

There were many others but after a lengthy deliberation we decided to award the £20 prize to Chris Bailey, of Cleveland: 'Our printers are top class but there's room for improvement in our elevators.' Congratulations, Chris — you'll also win a £30 voucher from Action Computer Supplies.

## Softek news

This could be the programming competition of the year — £1,000 up for grabs and you don't even have to finish the program.

'The entry can be a complete

product or something only half completed, but the entrant must demonstrate that they're presenting something new, original and innovative that isn't on the market already,' said Tim Langdell, managing director of the organiser Softek.

The contest closes on December 31, and entries should go to Softek at 12-13 Henrietta St, Covent Garden, London WC2. Mr Langdell wins the PCN prize (value £0) for finding four ways of saying 'new' in a single sentence.

## NEXT WEEK

**Burning bright:** On the cover and inside we look at the HH Tiger.

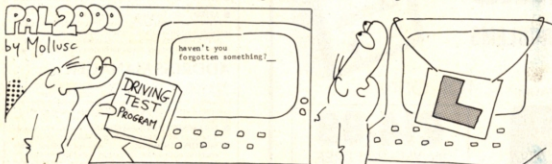
**Good health:** Three packages that will turn your Spectrum into a consulting room.

**Personal FX:** The second of our two-part series on BBC FX calls.

**Fort division:** An implementation of Forth for the ZX81.

**Games:** For the Commodore 64, Vic 20, and Spectrum and adventure on the Dragon.

**Plus all the regular weekly items:** news, letters, tips and hints, and the pull-out programming section.



## PCN DATELINES

PCN Datelines keeps you in touch with up-coming events. Make sure you enter them in your diary.

Organisers who would like details of coming events included in

PCN Datelines should send the information at least one month before the event. Write to PCN Datelines, Personal Computer News, 62 Oxford Street, London W1A 2HG.

## UK EVENTS

Event	Dates	Venue	Organisers
Computertown UK	October 31- November 18	Nailsea Library, Avon	Byte Micro Computing Centre, 0272 851337
Brainwave (Home Computing, Video & Electronics Family Show) Software Expo	November 4-6 November 8-10	NEC, Birmingham Wembley Conference Centre, London Dublin	Clapp & Poliak Europe, 01-747 3131 Interco, 01-948 3111
Home Computer Exhibition Personal Computers & Leisure Technology Exhibition — HOMETECH Malvern Micro Fair	November 9-13 November 11-13 November 12	Bristol Exhibition Centre Malvern Winter Gardens, Worcestershire Belle Vue, Manchester	SDL Exhibitions, Dublin 763871 Tomorrow's World Exhibitions Ltd, 0272 292156/7 Personal Computer Fairs, Worcester 22659
Manchester Apple Village COMPEC Computer Aided Design for the Building Professional Humberside Computer Fair Northern Computer Fair	November 13-16 November 15-18 November 16 November 20 November 24-26	London Olympia RIBA, 66 Portland Place, London W1 Winter Gardens, Cleethorpes Belle Vue, Manchester	Database Publications, 061-456 8383 Reed Exhibitions, 01-643 8040 Helen Carpenter, 01-637 8991 Jenson Lee, 0472 42559 Reed Exhibitions, 01-643 8040

## OVERSEAS EVENTS

Event	Dates	Venue	Organisers
Gulf Computer Exhibition Computer Indonesia Computer Dealers Exhibition	November 21-24 November 22-25 November 28-Dec 2	Dubai Jakarta Las Vegas, USA	Trade Centre Management, 01-930 3881 Overseas Exhibition Services Ltd., 01-486 1951 Interface Group Conference & Exposition Management, 160 Speen St., Framingham, MA 01701, USA

**EXCITING NEW GAMES FROM AN  
EXCITING NEW SOFTWARE HOUSE!!**

# Crack Ballon



**FOR THE COMMODORE 64  
26 SCREENS OF FUN PACKED  
ARCADE ACTION 100%  
MACHINE CODE - ONLY £7.95**

ALSO AVAILABLE

PUSH OFF 16/48K SPECTRUM  
THRUSTA 16/48K SPECTRUM  
McKENISIE 48K SPECTRUM  
SPACE JOUST UNEXP. VIC 20

**ALL £5.95 EACH**

AVAILABLE AT SELECTED BRANCHES OF MENZIES AND HOUSE OF FRAZER

## **DISTRIBUTORS CONTACT:**

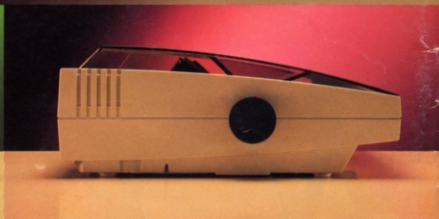
SOFTWARE PROJECTS,  
BEAR BRAND COMPLEX,  
ALLERTON ROAD,  
WOOLTON,  
LIVERPOOL L25 7SF  
051-428 7990

## **DEALER ENQUIRIES TO:**

TIGER DISTRIBUTION,  
4 VICTORIA ROAD,  
WIDNES,  
CHESHIRE  
051-420 8888



# THE MT80. SHAPED BY EXPERIENCE



You are looking at the sleek, ultra modern lines of the latest dot matrix printer from Mannesmann Tally; the people who probably have more experience in computer printers than just about anyone.

The MT80 is a high quality, low cost 80 column, 80 cps printer that will complement any of today's micros in looks and quality; in either the home or the office.

It has been designed with industry-

compatible interfaces in hardware and software.

Experience tells us exactly what you want from a printer - The MT80 has dual density dot addressable and line graphics. An easy change, long life cassette ribbon. It can handle both tractor-fed fanfold and single sheet paper. There is a unique quick tear facility giving you a clean cut along the entire width of the paper. And it even has an optional

sound reduction kit for those of you who like to hear yourselves think.

But best of all, it comes equipped with another valuable asset. A very attractive price tag.

Contact your nearest distributor or send for our colour literature.

Mannesmann Tally Limited,  
Molly Millars Lane, Wokingham, Berkshire  
RG11 2QT. Tel: (0734) 788711. Telex: 847028



**MANNESMANN TALLY**  
CREATING THE RIGHT IMAGE IN PRINT